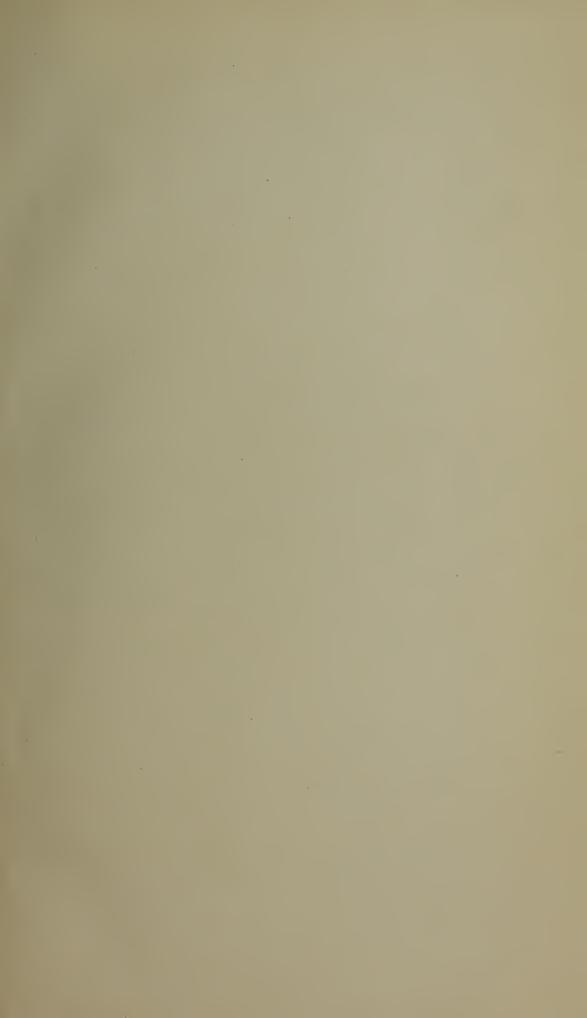
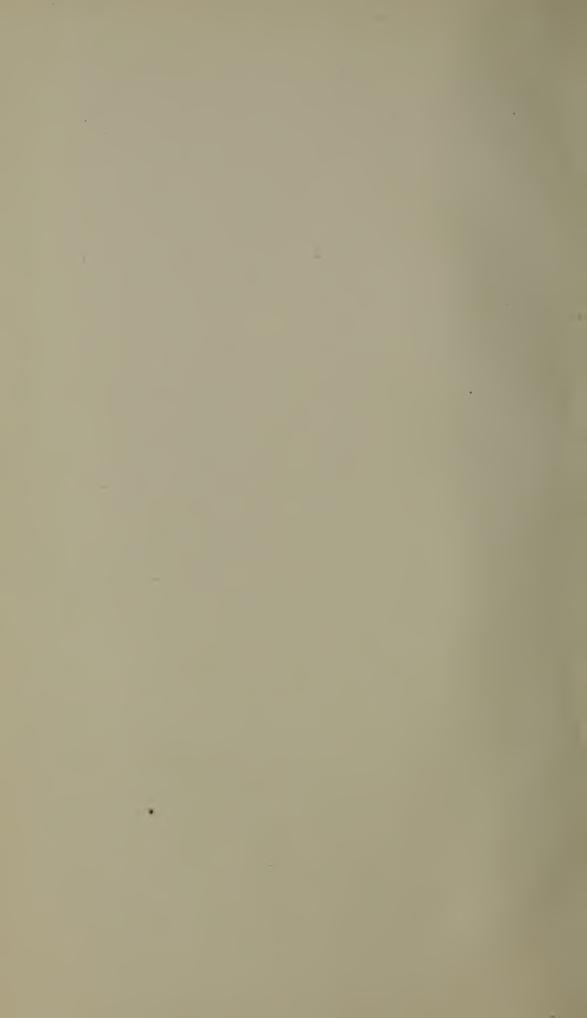


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E.E. Southand.

BULLETIN

OF THE

MASSACHUSETTS DEPARTMENT OF MENTAL DISEASES

(PUBLISHED QUARTERLY)

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WALTER E. FERNALD, M.D. GEORGE M. KLINE, M.D.

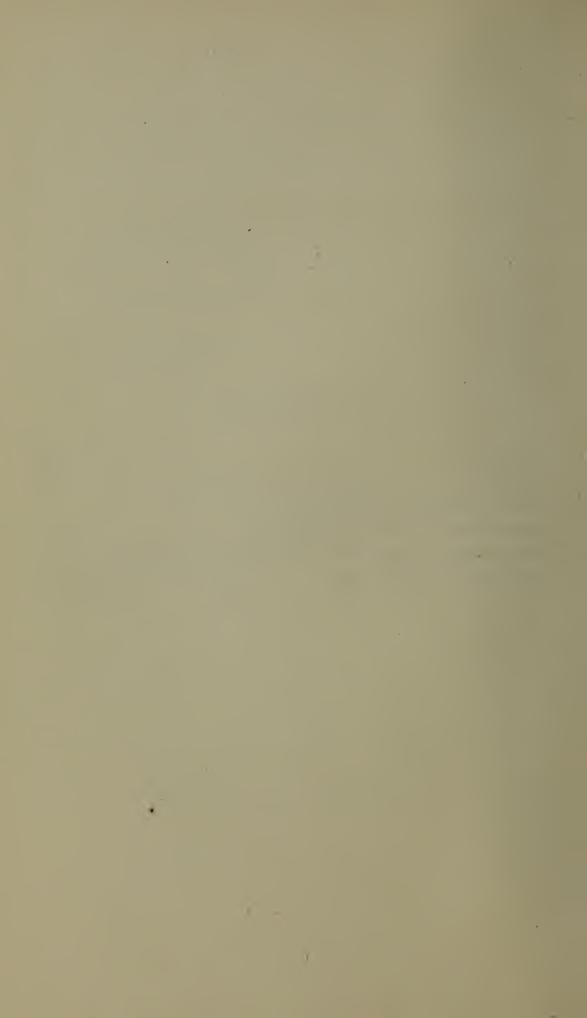


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SOUTHARD MEMORIAL NUMBER.

FOREWORD.

Dr. E. E. Southard was closely identified with the Massachusetts State Hospital service from May, 1906, to Feb. 8, 1920, nearly fourteen years. His early (1902) friendship with Prof. A. M. Barrett, then pathologist at the Danvers State Hospital, and his association with him in the department of neuropathology at the Harvard Medical School, made his appointment a natural one at Danvers, when Dr. Barrett was called to Michigan to be the director of the Psychopathic Hospital at Ann Arbor in 1906.

From May, 1906, to May, 1909, Dr. Southard was actively engaged in conducting laboratory work, always exhibiting a genial leadership, stimulating others to want to work, and collaborating with all in plans for scientific investigations. brought to the State service, even at this time, a perspective which tempered the enthusiasms of aggressive staff workers, while his outside interests kept him from the excessive loyalties which narrow vision. He continued to be a pathologist to the Danvers State Hospital until 1909, when gradually the general needs of the State were recognized by Charles W. Page, superintendent of the Danvers State Hospital, as paramount, and Dr. Southard was made pathologist to the State Board of Insanity. It was his duty to supervise the hospital laboratories, to which visits were made to stimulate scientific work, but his mind was more particularly occupied with plans for the Psychopathic Hospital of which he was appointed director in June, 1912. The same year that he was made pathologist of the State Board of Insanity, in 1909, he was also made Bullard Professor at the Harvard Medical School, which title he held to the last.

His seven years' work in the Psychopathic Hospital is well known; what his next decade of activities would have produced as the director of the newly created Psychiatric Institute can only be surmised. No doubt he would have continued to produce new truths in whatever field; to attack the most puzzling psychi-

atric problems; and to inspire his pupils with a passion for knowledge.

The Department of Mental Diseases lost its most brilliant officer Feb. 8, 1920, after an eventful week of medical addresses in New York City. The publication committee, in token of the esteem in which he was held by the Department of Mental Diseases, prints this bulletin in his honor.

GEO. M. KLINE. WALTER E. FERNALD.

RESOLUTIONS ADOPTED BY THE DEPARTMENT OF MENTAL DISEASES.

Whereas. The Commonwealth has lost a faithful servant through the death of Dr. Elmer Ernest Southard, Director of the Psychiatric Institute, on Feb. 8, 1920, we, the members of the Department of Mental Diseases, desire to record our great sorrow at his loss, and our high appreciation of his valuable service to the Department, to the institutions under its supervision, and to the Commonwealth. Dr. Southard entered the service of the State in 1906, at the Danvers State Hospital, where his work attracted attention, and he was made pathologist to the State Board of Insanity in 1909. With the opening of the Psychopathic Department of the Boston State Hospital in 1912, Dr. Southard was chosen as its director, while still acting as pathologist to the Board. He continued at the Psychopathic Department until appointed as director of the Massachusetts State Psychiatric Institute in 1919, where his work of usefulness covered the entire State. His brilliancy of mind, far-sightedness, unlimited capacity for work, and kindly disposition made him invaluable to the Commonwealth he so ably served. His associates will miss him.

Those interested in scientific research for the mentally sick and feeble-minded well know how great a debt of gratitude the Commonwealth owes to Dr. Southard.

As a recognition of his service, the members of the Department of Mental Diseases desire and order that this memorandum be spread upon the records and a copy thereof sent to Mrs. Southard.

MEMORIAL NOTICE.1

BY WILLIAM N. BULLARD, M.D.

Dr. Elmer E. Southard was born in Boston in 1876, was educated in the public schools, and entered Harvard College in 1893, graduating with the degree of A.B. in 1897, and A.M. in 1902.

As a boy he seemed to have been in no way unusual, except that he took many medals and prizes at school. In college he was much interested in philosophy, and studied under both James and Royce. This interest lasted him throughout life, and as long as Royce lived and taught, Southard attended his seminaries at Cambridge. Once, indeed, when Royce was incapacitated, Southard took some of his work for a time.

His chief outside interest while in college was chess. He became an expert amateur chess player, was chosen to represent Harvard in the matches with Yale, and was a member of the Harvard Chess Club. In later years, when he was working hard in the medical school or hospital, he told me that his relaxation used to be to go down to New Haven in the evening and play chess all night. He sometimes played chess blindfolded. The very unusual powers thus shown undoubtedly displayed themselves later in his work.

On leaving Harvard College, Dr. Southard entered the Harvard Medical School, taking his M.D. degree in 1901. He was made pathological interne in the Boston City Hospital in 1901, and later assistant in pathology in 1903. In 1901–02 he was abroad for a time at Frankfort and Heidelberg. In 1904 and 1905 he was assistant visiting pathologist at the Boston City Hospital, and at this time (1904–05) became instructor in neuropathology in the Harvard Medical School. From this time on he continued steadily in the work of neuropathology, his life work, becoming assistant professor in 1906, and in 1909 Bullard professor of neuropathology, which position he held at the time of his death.

Dr. Southard, in later years especially, was a prolific writer. He read many papers before many medical societies and associations, and he was a member of all the prominent national med-

¹ Published in the Boston Medical and Surgical Journal, April 8, 1920.

ical societies in his line and many others. His first paper of which we have record, published in 1901, was "A Case of Glioma of the Frontal Lobe," a purely pathological account of a cerebral condition. He wrote little in the next two years, but in 1904, or 1904-05, published six papers, all purely pathological. In 1905 and in 1905-06 we find five papers written either alone or in collaboration with others, all, as before, neuropathological in the narrowest sense (pathological). In 1906 Dr. Southard became pathologist at Danvers State Hospital, and he held this position and that of assistant physician in the same hospital from 1906 to 1909. We have records of four papers published in 1906 and two in 1907, all of the same pathological nature. "Outline of Neuropathology" was published in 1906. During these years (1906-09) Dr. Southard was much occupied at Danvers, not only in collating and arranging his thousand autopsies in order to form a basis for his future work, but in attending the early morning clinics at the hospital, and in very interesting investigations with Dr. Gay into certain aspects of anaphylaxis. This work was specially valuable to Dr. Southard, as it was the first opportunity to widen and broaden his field of work. How important this was he early perceived, and he understood that neuropathology, as it should be conceived and as it was defined from the terms of the gift of endowment of the professorship, was not simply the study of pathological details, however important a part these might play as a foundation or basis for other investigations, but comprised many wide and far-reaching issues, touching and forming links with many allied subjects. Many of these allied subjects became, as they were more nearly approached and more closely examined, so intimately connected with and concerned in the stricter neuropathological investigations that they necessarily became a part, and were included in the observations and researches, of the more experienced neuropathologist. They became an actual part of the subject of neuropathology in its widest and truest aspect.

From this time on the scope of his work grew ever wider and wider. He also studied other collateral lines of work, as when he went to England in the summer of 1907 to work with Sherrington on physiology.

In 1907-08 he published with Dr. Gay the article "On Serum Anaphylaxis in Guinea Pigs," which assumed much importance at the time, and he also published at this time four other papers, all on pathological subjects.

In 1908 "The Relative Specificity of Anaphylaxis" was published in collaboration with Dr. Gay, and also four articles, entitled "Further Studies in Anaphylaxis," with the same author. In addition to these there were seven other papers, clinical or pathological.

In 1908-09 there was published in the "American Journal of Insanity" an article by Dr. Southard and Dr. H. W. Mitchell, entitled "Clinical and Anatomical Analysis of 23 Cases of Insanity arising in the Sixth and Seventh Decades, with Special Relation to the Incidence of Arterio-Sclerosis and Senile Atrophy and to the Distribution of Cortical Pigments." This was one of the first contributions from the analysis of the Danvers cases which later furnished the basis for so many observations.

It is not worth while to detail the many papers or articles of so prolific a writer further than to point out work of special interest from some standpoint. In 1909, besides many other papers, Southard published three on bacillary dysentery, following the epidemic thereof at Danvers in 1908.

In 1910 came the paper on "Senile Dementia," and his work on "Dementia Præcox" was started.

The year 1912 was, again, a very active one, with articles on the Psychopathic Hospital, of which he had become director, and on "Normal Looking Brains" from the Danvers material.

In 1914 a most suggestive paper on "Lesions of the Optic Thalamus" was published, and one on "The Topographical Distribution of Certain Lesions and Anomalies in Dementia Præcox."

These last years were more or less fully occupied with his work at the Psychopathic Hospital, where he gave clinics. After the details of management, arrangement and teaching at the Psychopathic Hospital had been somewhat settled, Dr. Southard was at liberty for a short time to give attention to the great problems of neuropathology, and at this time he began to put into application a principle which he had long carefully thought out. This was the application of facts and classifications in one branch of knowledge to another apparently only distantly related. His first attempt at this seems to have been "On the Application of Grammatical Categories to the Analysis of Delusions." The idea that the principles, categories and classifications used in grammar could be applied with advantage in the analysis of mental states was an illuminating one. Dr. Southard studied grammars of various languages carefully, and sought to obtain the principles on which the languages were built.

He was also a great student of the dictionary, — of words, and of the meanings and derivations of words. This knowledge had a fascination for him, and led him not only to use many words not in common or general use in his addresses and writings, but also aided him greatly when, as often happened in later years, he desired to coin new words to express new ideas, new classifications or new connotations.

Dr. Southard was very decided in his view that brain diseases, insanities and dementias as well as others, should not be considered simply as disorders of the nervous system, but as disorders of the body as a whole. In every insanity the whole body should be examined and considered. It was partly in connection with this very strong feeling that he published in 1914–15 his article "On the Nature and Importance of Kidney Lesions in Psychopathic Subjects."

He worked vigorously during these years, 1914-16, and published several articles on conditions in dementia præcox and in manic-depressive insanity; also in epilepsy, which he had for many years carefully studied.

In 1916 came his "Stratigraphical Analysis of Finer Cortex Changes in Certain Normal-looking Brains in Dementia Præcox." In 1917 he published ten papers.

In 1918 his very important paper on classification of disease for diagnosis, "Diagnosis per Exclusionem in Ordine" appeared; also "The Kingdom of Evil," which has been of great suggestiveness.

From 1916 onward Dr. Southard's interests broadened and widened and his work extended in many different directions.

While still working at neuropathology in the narrower sense, and studying the minute anatomy of the brain in dementia præcox and manic-depressive insanity, epilepsy, etc., he was formulating ideas in relation to the conclusions to be drawn from the facts thus obtained. He was also working in many other directions.

- I. In collaboration with Dr. Fernald he undertook the publication of a work on "The Brains of the Feeble-Minded," and Part I of this was published in 1918. It may be fairly stated that this is the first scientific work carried out with all the newer and more exact means of research on the brains of the feeble-minded. (Part II of this work is almost finished and shortly to be published.)
 - II. He conducted investigations into the psychology and

mental states of employees in various factories and establishments, showing how the knowledge of specialists in his line could be applied to great advantage in the choice and adaptation of workers, thus entering the subject of industrial hygiene, and proving its close connection with the studies of neuropathology.

III. In his work at the Psychopathic Hospital he had instituted a psychiatric social service. In this he was much interested, and in several papers he explained what this service was, what its value, and how it was differentiated both from ordinary social service work and from psychiatric nursing.

In his later years Dr. Southard felt that the time had arrived when it was advisable for him to place his knowledge before the profession and others in books rather than in more or less fugitive articles. He therefore devoted his attention to writing these, usually in collaboration with some one. Of these books two have been published: "Neurosyphilis," with Dr. H. C. Solomon, in 1917, and "Shell Shock," in 1919. He, however, had in mind other books at the time of his death, and some of these were far enough along to enable us to hope for their future publication.

Dr. Southard was a neuropathologist, and all his work and interests centered around neuropathology as he understood it. Neuropathology, to his mind, comprised much more than the mere cutting of sections and examining them microscopically, or even the deducing of great and fundamental facts from them. It embraced all or any research or work which bore on or related to the action of the nervous system to its environment in health, or, more especially, in disease. All his other work was subsidiary to this central idea. But his other work in various lines was so excellent, so valuable and so dominating that he has been variously claimed as a philosopher or psychologist, as a social worker par excellence, as an industrial health worker and as a psychiatrist, and in each of these departments it has been said that he belonged to that department pre-eminently. In reality, all this work in these lines was secondary or collateral to his great aim, - the knowledge of the formation and character of the nervous system in disease, and its relations in the internal and reactions to the external world. The unusual amount of work which he accomplished, and the energy and enthusiasm which he showed in working on these various problems which were all correlated in his mind, is the excuse for the point of view of the separatists. He has written 150 articles. He had at

the time of his death seven books in his mind, most of them in some degree of preparation.

I have not entered here into any description of his peculiar abilities. He had remarkable powers of deduction, and in addition he had an extraordinary and most unusual capacity to perceive the salient fact and the conclusions to be drawn or which were suggested by any series of facts. A paper written by an assistant, which seemed to be stupid, useless and uninteresting, became under his hand both valuable and illuminating because the important facts were brought out and placed clearly before the reader.

Dr. Southard died in New York City of pneumonia, Feb. 8, 1920. He left a wife, Dr. Mabel Austin Southard, to whom he was married in 1906, and three children, — Austin, Ordway and Anne.

AN APPRECIATION OF ELMER E. SOUTHARD.1

BY RICHARD C. CABOT, '89.

Prodigious personal energy, such as radiated from Ernest Southard, often clothes itself in a hard dour exterior, like a steam engine or a fighting bull. But the peculiarity of this great psychiatrist was that he was always bubbling over with merriment. No one more ready to laugh, though no one took the world more seriously, if incessant systematic industry is a mark of seriousness. Such childlike merriment is not the common mien of those who spend their lives in laboratory research and in contact with the insane. The rollicking joviality of his boyhood might well have left him altogether when he settled himself to hour after hour of microscopic work on the shrunken brains of feebleminded children. How could he keep his sparkling, rosy-cheeked good humor despite his contact with the black despairs, or the vacant-minded animality of the insane?

Harvard is the answer. At Harvard he struck his roots so deep in the solid ground of philosophy that he could live face to face with the saddest and most discouraging of all human experiences — feeble-mindedness and insanity — and yet preserve not merely a stoic calm but an irrepressible happiness. He came to Harvard with no social prestige, with no capacity for athletics, with no single advantage except a leaping and brilliant mind, which till then had never found itself an asset. He had always loved to think and read, but it came to him at Harvard, with a shock of delighted astonishment, that there was something of real value in the possession of an active mind.

His brilliancy in chess first brought this home to him. Finding himself intercollegiate chess champion and one of the best amateur chess players of the country, he began to realize that he could achieve a standing by means of what came easy to him. He did not discover philosophy at the outset and thought that he could find what he wanted in the study of comparative grammar! Strange point of attack on life, it seems, for an apparently care-free undergraduate, but quite easily understood when we see what he was groping for. He was fascinated by the psychological suggestion of the active and passive voices, the subjunc-

¹ Reprinted from "The Harvard Graduates' Magazine."

tive mood. In later life he was prone to express his objections to the Freudian psychology, to the Hebrew temperament and to the deterministic prejudice of psychiatrists by saying that they were exclusively in the passive voice. And only a few hours before his death he remarked with a twinkle to a companion, when his nurse forced him to observe some detail of sick-room routine, "You see, F., we are now in the passive voice."

But he was not so in college. His actively inquisitive mind soon found that not with the comparative grammarians but with the philosophers he was at home. Thus he became the ardent student and follower of two great philosophers, - William James and Josiah Royce. Perhaps the catholicity of his mind was both the cause and the result of this unusual devotion, not to either alone, but to both of these strongly contrasted masters. Either he did not find their teaching contradictory or he grasped from each of them the ideas and impulses that did not contradict each other. At any rate, he became the genuine disciple of each of them. He loved and revered them both. on their work and propagate their ideas was a large part of his subsequent life work. "I give that course in psychopathology in Cambridge," he said to me one day, "mostly as tribute to James," and in a newspaper interview a week before his death, he said, apropos of "psychical research," "In the first place, I must explain that I am a pupil of William James, and that I never have felt that I wanted to differ from him very much in any of his beliefs regarding this sort of thing." Now this was said in the present tense — "I am a pupil of William James," despite the fact that Dr. Southard graduated in 1897 and had not studied with James for at least twenty-three years. is the spirit of actual discipleship.

The degree of his attachment to Josiah Royce may be imagined when we realize that he took Professor Royce's Logic Seminary year after year for thirteen years; indeed, up to the time of Royce's death. During five of those years I was in the seminary with him, and so am able to trace to that source many of the ideas that came sprouting out later in his medical addresses, often to the mystification of his hearers.

Both his masters stimulated and fed his natural craving for research, which was, I think, the central passion of his life. Jubilation at the birth of new truth seems more characteristic of him than any single trait that I know. He was not soberly pleased with a new idea. His mind gamboled and capered about

it with radiant delight. He played with it, turned it upside down and inside out, tossed it up and caught it again. Sometimes (alas!) he did this before an audience — discovered the new idea there before their eyes (though quite invisible to them), and proceeded to play a game with it in celebration of its birth. New ideas! Then why not new words to clothe them properly? And incontinently he would coin some new combination of Greek roots, which in turn, perhaps, would remind him of Charles Pierce (one of the three great American philosophers, he thought, and certainly one of the most abstruse). A flow of reminiscent metaphysics would gush forth, till his audience was apt to think he was laughing at them instead of at his new-born idea.

Probably the greatest limitation on his influence was thus stubbornly entangled with his best and central characteristic, — his tumultuous joy in new truth, new facts, new plans. Readers were sometimes repelled, listeners mystified or annoyed, because new truth was so precious to him that he must celebrate its appearance, in season or out. Yet this ungoverned rejoicing was the symbol and the starting point of his creative work. Nothing in him was more precious than his originality. Nothing stimulated so much the latent originality of his fellow workers. His enthusiasm for research and his joy in its results was soon to make him the soul of a new institution — the Boston Psychopathic Hospital — and the originator of two largely new professions. New work, new projects radiated from him in all directions.

Yet there was nothing scattered or superficial in his work. His profundity was greater than his brilliancy. He stuck to one tough job for fourteen years, all the years of his working life—the study, post mortem, of diseased or defective brain tissues. On this task his hours at the microscope, added together, must have totaled several years. Sixty-two published papers described the results obtained in this study alone. Yet they were but the surmounted foothills of the mountain of work planned by him on this subject for the next fifteen years. "I would like to find the minimum brain machinery with which speech and thought processes get performed," he wrote last August (answering his own question, "With the war over what for me to do?"), "and I hold that a proper medical, pedagogic, physiological and anatomical study of feeble-mindedness will bring this ideal about more quickly than any other thing. I might be willing

to spend my whole life on this problem, feeling that a knowledge of feeble-mindedness would bring a knowledge of thought, and thus the greatest deepening of philosophy of which I personally am capable."

The closing phrase — the ultimate goal of the whole life effort — is significant. It is amplified in another passage from the same statement of his future plans: "Perhaps I believe that the world can get forward most by clearer and clearer definition of fundamentals. Accordingly, I propose to stick to tasks of nomenclature and terminology, unpopular and ridicule-provoking though they may be." He was aware of the unfashionableness of a search for fundamentals, but this did not deter him — even stimulated him, perhaps. "For I have to contend with a deep desire not to be popular," he wrote. "I would like to understand this desire not to be popular coupled with as strong a desire to stand well with certain people. This class needs defining. problem is linked up with that of aristocracy — the kind that I believe in. The nearest I come to it is that the aristocracy I like is that of people who want to dig out novelty. Underneath this I seem to have a moral motive, a confidence that whatever is new is likely, on the whole and in the long run, to be better than what we have. Otherwise, what is the good of time, anyhow?"

Was he a scientist or a philosopher? His two weighty books (on "Neurosyphilis" and on "Shell Shock") are certainly scientific, as are the great majority of his 159 pamphlets, reports and monographs thus far published.

But I think the truth is that he had learned from Royce and James the true relation of science and philosophy, so that he could use either as he needed it, or subordinate them both in the art of psychiatry. He used, served, extended and revered physical science. But he avoided its passing fashions, and never mistook it for the only method of finding truth or the only guide to action. He used the biologic point of view in his thinking. But he was never hypnotized by the German fashion of applying it indiscriminately to all fields of thought. The scientific fad of determinism never fooled him because he knew how to use it and when to lay it aside. His philosophic training under men who used scientific method without becoming enslaved by it had prepared him to avoid the philosophic pitfalls into which biologists, psychologists and psychiatrists are apt to fall.

But this is something new in his field. An optimistic psy-

chiatrist who believed in the soul, who was not a materialist or a determinist and therefore not a Freudian — this was something quite startling; in fact, quite scandalous, some thought. For after graduating at the medical school in 1901 he had difficulty in getting a position as assistant in pathology at one of our great Boston hospitals, because he was known to be a disciple of Royce and James. But I prophesy that his fame for pure scientific work will far outlast that of those who then so nearly rejected him for the crime of having studied philosophy.

It is an astounding fact that, despite the characteristics which I have described, he became a public official, and held office under the State of Massachusetts for fourteen years, from 1906 till his death in February, 1920. He, a philosopher, a research man and (in his own sense) an aristocrat, distrustful of legal and governmental methods, an outspoken individualist, was yet able to enter and to hold public office, to deal with politicians, Legislatures and budgets, and to get his work done and still keep smiling. It was, he said, a matter of technique. "Father's word," said his little son, "is technique," and indeed he used this word with catholicity. I have heard him speak of the technique of dealing with Legislatures, and in almost the next sentence of the technique of Jesus Christ.

But in a more usual and limited sense he used the technique of the pathologist in the group of hospitals for the insane maintained by the State of Massachusetts. With the assistance of Dr. Myrtelle M. Canavan he studied countless autopsies on patients dying insane in these institutions, and pursued the microscopic study of their brain tissues to and beyond the limit of present knowledge. No one else, his assistants tell me, was so skillful in this work as he. He could find what every one else passed over. His touch was minutely sensitive to the consistency of brain tissues, his eye expert in microscopic diagnosis. work covered at first the whole field of his teaching as Bullard professor of neuropathology at the Harvard Medical School, and was continued up to his death. One thought of him then as an expert in the study of the dead brain - healthy, diseased or defective. He studied especially the supposedly normal brains of persons dying insane, and tried to correlate the microscopic abnormalities which he found with the particular delusions of the patient during life. Thus he suggested, for example, that delusions of hearing (imaginary voices, bells, etc.) are linked with microscopic disease in the brain centers of hearing.

Such studies as these filled most of his time from 1902 to 1912. They led him to define one of the leading issues of his science as the difference between those who believed that mental disease was due to a "brain twist," a psychological derangement, and those who believed, as he did, that a "brain spot," a diseased area in the brain, was the cause. ("The Mind Twist and Brain Spot Hypotheses in Psychopathology and Neuropathology." Psychological Bulletin, 1914, XI, 117.)

But he quickly began to make his own ideas tell in the administration of the State institutions as well as in pathology. He saw the deficiencies as well as the latent possibilities of the remote and isolated State institutions for the insane, and began at once to stimulate the men working there along the broad lines of research. He established between the Danvers Hospital and the Harvard Medical School "a voluntary but close co-operation in neuropathology which continued for many years. He linked together the different State hospitals in a co-operative research on psychiatric problems that has continued to this day."

Any one who had known him only by his published work up to 1912 might have pictured Southard as destined to sit contentedly on a laboratory stool with his eye to a microscope for the rest of his working life. But in that year the State of Massachusetts showed extraordinary good sense by appointing him director of the Boston Psychopathic Hospital, a new institution built near the Harvard Medical School, and intended for temporary care of patients who might or might not turn out to be insane, — a diagnostic station for the study of mental defects or possibly mental disease, without the ponderous shackles of legal commitment. This was in itself a novelty and an important improvement. But a still more original feature, adopted at Dr. Southard's suggestion, was an out-patient department; that is, a place to which patients suspicious of their own mentality, and those whose sanity seemed doubtful to parents, friends or social workers, might be brought for examination and diagnosis. This department he put under the charge, not at first of a psychiatrist, but of a pediatrician, Dr. W. P. Lucas, in order to link neuropsychiatry into close union with general medicine.

The insane, the feeble-minded, the alcoholic, drug habitués, cranks, "queer people," geniuses, criminals whose acts suggested a "brain spot or a mind twist," doddering ancients near the edge of insanity yet oftentimes not insane, people with disease of the kidney, the thyroid or other organs capable of producing mental

symptoms by poisoning the whole body and brain, germ diseases with brain symptoms, — these and many others came to the outpatient department of the new Psychopathic Hospital.

To this influx of heterogeneous misery can be traced four inventions which Dr. Southard has left us to carry on. New resources were called for if such a multifarious assortment of living problems was to be met, studied and (to the limit of knowledge and skill) solved. He rose to the greatness of the challenging opportunity and evolved four new ideas:—

- 1. The idea of the neuropsychiatrist.
- 2. The idea of the psychiatric social worker—social psychiatry.
 - 3. The diagnostic scheme of the Kingdom of Evil.
 - 4. The idea of orderly exclusion in diagnosis.

Each of these (like every other invention) can be challenged as not wholly new. There had been other neurologists who understood psychiatry also (the mind's diseases as well as the nervous system), but few if any who considered their province to be the whole human being in all his relations and aspects! Not diseases of the mind and nervous system only, but all bodily diseases which could affect the mind; not disease alone, but congenital defect or feeble-mindedness which is ordinarily studied by specialists in that defect alone; moreover, the effect of old age, the character defects due to bad training, to economic evils, to "gangs," the whole problem of delinquency, of litigation and its attendant evils, of unemployment or wrong employment when it upsets mental or moral health, — all this was the field of the neuropsychiatrist such as he had set himself to become.

Why attempt to cover such an enormous area? Because all these problems presented themselves at his hospital door, and because in a single patient all or nearly all of them might need to be inquired into and excluded one by one until the diagnosis of one sufferer's troubles was found. The feeble-minded man might be also alcoholic, syphilitic, delinquent, insane or merely abused by his family. There could be no sorting out or passing round of such an individual into various clinics without great "loss of motion" in the process.

Of course the interest of such a profession was as great as its area. It developed all sides of the doctor in order that he might investigate all sides of the sufferer. It brought him in touch with all the queer people interested in the hospital's still queerer patients. It forced his mind across the professional boundaries

of medicine and made him a leader in the movement of our time against the inhumanly narrow specialism of twenty years ago.

But he was too wise to try to do everything himself. He associated himself with Dr. H. C. Solomon in a masterly and original book on "Neurosyphilis." Moreover, he soon found out that parts of his job could be done better by women. The natural ups and downs of a woman's moods, the plasticity of her sympathies, fitted her better than the rest of us (he believed) to enter into the mental and moral intricacies of his patient, and especially into his domestic life, into the school life of children and the whimsies of the eccentric. When properly trained in the rudiments of psychiatry, a sensible and sympathetic woman could follow up the clues hit upon by the doctor in his first examination of the patient, bring back fresh data from study of his home, his school or his work, and so contribute to a wellbalanced and accurate diagnosis. Moreover, she could do much to carry out the re-education, the family readjustments, and the institutional treatment which issued from the diagnosis.

Thus was born the idea of the psychiatric social worker as established by him at the Psychopathic Hospital and in the other State hospitals for the insane. Like his idea for an out-patient department for psychiatric cases, this new profession was not wholly new, yet it was at first ridiculed, and then partially though widely adopted by the old-line members of his profession. He was constantly reproached for his innovations, and as constantly imitated in them. Finally Smith College, in the summer of 1918, gave him the opportunity to establish the first school for psychiatric social workers. The sixty enthusiastic graduates of this school were intended originally for war work with "shell-shocked" soldiers, but have since then found plenty of opportunities open to them in civilian institutions. In this course he was but one of many teachers; yet the alumnæ considered and named him "the Father of our Course."

Contact with the social aspects of his patients' troubles and with the psychiatric social case studies undertaken by Miss Mary Jarrett, took him far into the field of social work. He read Miss Richmond's masterly book, "Social Diagnosis," and was led to attempt a new diagnostic classification of all the evils that poured pell-mell into his hospital in the persons of his patients. Like all his classifications, this had practical ends, — thoroughness, order and the saving of time. The Kingdom of Evil, as he saw it in his day's work, consisted of —

- 1. Disease (physical or mental).
- 2. Ignorance (or error).
- 3. Character defect.
- 4. Legal entanglements (delinquency, litigation).
- 5. Poverty (or resourcelessness of some type).

To study anybody's troubles, anybody's melancholy, revolt or weakness one must ask, first, is it due to disease (for disease is the commonest and the most easily attackable of such evils). Next, is it due to misinformation, deficient information or misinterpretation of fact? For this sort of trouble next to disease is the simplest to deal with. If neither of these evils can be found, character defect and legal entanglement must be sought for. Finally (because it is least common), we may ask whether pure economic defect is the root of the evil. The evils of poverty, he believed, can be shown to be due in almost every case to disease, ignorance, character defect or litigation. Pure poverty, as a correct social diagnosis, he very rarely found. Yet if the orderly search for the other evils is not undertaken first, poverty may stand out so as to become not merely an element (as in the 80 cases listed below), but the only diagnosis. Then economic relief may be given, with harm as a result.

Classified in this way he found in a preliminary survey of 430 problems studied at the Psychopathic Hospital 72 of disease, 16 of ignorance, 157 of character, 105 of legal difficulty and 80 of poverty.

At the time of his death he had just begun to attack these problems in detail. A book entitled the "Kingdom of Evil," written by him in conjunction with Miss Mary Jarrett, was nearly finished, and will be, I hope, published shortly.

In family difficulties he wished to find out, first of all, "Who dominates this family?" For through the dominating member, he thought, suggestions could best be introduced and improvements wrought. "You will find some families dominated by the mother — matriarchal, we might call them. Others are of the patriarchal type; the father dominates. But in my family the daughter is the central figure." (Whereupon he proceeded to coin a new word denoting domination by the daughter.)

"Then we need to know how many parties there are to a quarrel — how many opposing points of view. There are rarely more than three. The situation, as we find it, is usually duadic. There is the father's point of view versus the mother's; or the parents' arrayed against the daughter's. The other children,

friends and relatives usually espouse one or the other, so that their testimony is merely cumulative. But the social worker's own view may well be different from either of those existing before she came into the problem. Then the situation becomes triadic. Beyond that you will rarely find a fourth distinct standpoint. Three is usually the limit."

In pure medicine, none of his ideas, I believe, will prove more fruitful than that of "diagnosis by orderly exclusion." When we hunt through our pockets for a letter, we pursue the diagnosis (where's that letter?) by exclusion. We search one after another the places where it may be until (perhaps) we find it. method is also used in medicine, but not always with good results. For the diagnosis may be in none of the pockets investigated; perhaps we forget an out-of-the-way pocket (in another suit, possibly). Dr. Southard proposed a plan (a) for an exhaustive search through all the known alternatives, such exhaustiveness being shielded for errors of memory by making it (b) orderly. The order was to be determined by various practical considerations. In his own specialty he listed the best-known and most curable diseases first. This involved an ordered tabulation of mental disease or defect, in classes and subclasses. Within some one (or more) of these the diagnosis must lie, in case it lies anywhere among the diseases already known to medical science.

Had he lived and continued in control of the Psychopathic Hospital he would, I believe, have applied in the examination of all out-patients the tabulation of "The Kingdom of Evil." Then if the evil proved to be of the nature of disease he would have repeated the orderly exclusion with his finer-meshed scheme of psychiatric classification.

So far as I can see, no one has a right for the future to use any other method than this in medical and social case work, until he can point a better one. One can trace in it both the pragmatism of James and Royce's passion for the concept of order. One can see also an example of Southard's type of originality; he applied in a new field concepts or tools of method taken from an old one. He brought grammatical categories (passive voice, subjunctive mood) into psychiatry. He applied medical logic (diagnosis by exclusion) in the field of social work, and so invented the diagnostic tool called the "Kingdom of Evil." He brought the methods of social work into psychiatry, and combined the two in the psychiatric social worker. All this was a peculiarly Roycean idea. Such comparison and transference of concepts from many

fields of thought was the central topic of Royce's Logic Seminary, and made it possible to draw into it biologists, mathematicians and theologians for mutual comparison of their working tools and mental processes. Like a good disciple, Southard carried this master's idea into new fields.

The memory of his other master, James, urged him to quite a different venture. In the last few years of his overflowing life he undertook, under a grant from the Engineering Foundation, to study the psychiatric aspects of industry. Carleton Parker's work interested him. Phenomena like the I. W. W. he wished to analyze as Parker did by studying the men's state of mind and the causes which produced it. Strikes, excessive "turn over" in industry, the different types of labor union leadership, could be profitably studied, he thought, under the "cross light of psychiatry." An obsession, a queer temperament, a mental twist, a psychopathic personality, might explain much for which economic solutions are unsatisfactory, and so might give us the key to remedial action. He had not time to go far in this direction. Hopes and plans, not fulfilments, are what he left us in this field which he thought of as part of a huge and shadowy project to which he and others gave the name of "the mental hygiene movement."

Mental hygiene was, he thought, a timely way to attack in a fresh spirit the ancient problems of education (secular and sacred), of recreation, family life, politics and social reform. Ethics was for him best attacked as mental hygiene, and he had planned to give under the department of social ethics at Harvard some courses which in one of his last letters he called "Psychiatry and social ethics" (or simply mental hygiene). I often asked him what was really known about mental hygiene in the more limited and ordinary sense. He always admitted that it was an empty space to be pre-empted, rather than a body of doctrine to be preached — a hope and a plan, not a fact. He wanted to attack all the old problems in a new way, and so with a good deal of opportunism he caught up the term "mental hygiene" as one conveniently suited to the mood of our time. Adopting Dean Pound's suggestion, he meant to divide the propaganda for mental hygiene into three groups, (a) public (or governmental), (b) individual, and (c) (intermediate between the other two) social, including all groups such as colleges, labor unions, clubs.

He was somewhat torn between his propagandist ideals like mental hygiene and his research ideals. In time I think the

latter would have conquered. Yet in one of his latest writings his propagandism was rampant and refreshing.

"May we not rejoice," he wrote, "as psychiatrists, that we, if any, are to be equipped by training and experience better, perhaps, than any other men to see through the apparent terrors of anarchism, of violence, of destructiveness, of paranoia — whether these tendencies are shown in capitalists or in labor leaders, in universities or in tenements, in Congress or under deserted culverts. It is in one sense all a matter of the One and the Many. Psychiatrists must carry their analytic powers, their ingrained optimism and their tried strength of purpose not merely into the narrow circle of frank disease, but, like Séguin of old, into education; like William James, into the sphere of morals; like Isaac Ray, into jurisprudence; and above all, into economics and industry. I salute the coming years as high years for psychiatrists."

He was, as I have said, a great disciple. He was also a great gatherer of disciples. Nearly sixty men during the past twelve years have worked under him in such close relations that each felt him nearer than any other friend. Each confided to Southard his love affairs, his financial worries, as well as his scientific problems. To him each poured out his soul as to no other, and, if at a distance, kept up steady correspondence with him. Even men who had been with him but a few hours felt themselves his intimates. Part of this devotion was due, no doubt, to his utter freedom from jealousy. When men working under him used his ideas, accomplished a piece of work and got credit for it, he seemed more pleased than if he had done the work himself. Part of their devotion also was a response to his clear sparkling jubilant nature, always ready to go full speed in thought or work, whether it was his own or other's.

He was too kind hearted to discharge any employee, no matter how incompetent. He was so haunted by the thought of a moral downfall precipitated by the discharge that he would not be responsible for it. No doubt there was another element in his leniency. He believed that his psychiatric training ought to make him able to get on with people with whom no one else could get on. But it was not his psychiatric training but his power of rich mental association and his hopefulness that made him always listen so patiently and attentively to any idea con-

¹ Presidential address before the American Medico-Psychological Association, June 18, 1919. American Journal of Insanity, October, 1919.

fided to him by his assistants. "He could so easily have made us feel foolish, but he always listened as if we had brought him something profound. He did not always try to gloss over the superficiality of the remark, but he saw lines and leads in it which escaped many and certainly the original propounder."

A boyish simplicity was natural to him. He had no consciousness of dignity, though he possessed it, and almost as little, apparently, of his body, though it was a very imperfect one in many ways. He never seemed to want rest, took practically no vacations, worked every evening and every Sunday, and was rarely forced to miss a day throughout the year. Though easily amused, he took almost no recreation, except chess, which filled one or two evenings a month. With this and his work and the use of his mind in floods of talk and discussion he had all the play he wanted. His idea of a holiday was to go to New York and shut himself up in a library where he could get in fifteen hours of reading uninterrupted.

From childhood up his reading was voracious, and though he rarely read the whole of any page, he seemed to miss nothing. Recently he spoke to me of having gone through the whole of George Meredith's novels in search of character types (the sage, the egoist, the silent man). On another occasion he had re-read the book of Job to find examples of his five types of evil, and galloped through a bunch of law books to catch the "spirit of laws." Yet, despite his wide ranging generalizations and his innumerable journeys for the reading of papers, he never lost his grip of detail or his capacity for minute, laborious, inductive work. The scholarly elaboration and minuteness of detail in his last two books makes this abundantly clear.

Resiliency was one of his most endearing traits. By nature and by principle he was bound to turn every misfortune into some particular good, so that in the end it would be better than if the misfortune had not occurred. In this he had in mind Royce's doctrine of atonement. "To use the psychopathic by-products of society to its betterment, a sort of similia similibus curantur idea," was the way he phrased this last summer. As Mme. Montessori derived improvement in education from the methods used to rouse the brains of the feeble-minded children, so he hoped to get light on family life as it should be by the study of families containing one or more psychopathic black sheep, and on normal psychology by studying the mind diseased.

When dates were not kept or specimens spoiled in the labora-

tory, "It doesn't matter" was his habitual expression. "Let's have a polychromatic world, not a monochrome." Never to take a passive, an oppressed, a down-hearted or disappointed attitude was a principle with him. Passivity, he held, is disease; activity is health. Every setback, every misfortune set him scheming anew. In fact, as one of his close friends said, "Surely, he must have turned his own death to some advantage."

He made some enemies by the directness and power of his attacks on what he regarded as abuses or entrenched evils; also by his habit of playing with ideas before an audience. "But even his enemies loved him," one of his disciples told me. In a world no more Christianized than ours, it is hard to think of a higher tribute than that remark.

He refused to make money, as he easily could have done by consultations or by accepting some of the high-salaried positions offered him. He preferred to live on his small academic and State salary because this allowed him time for the research work which he wanted most of all to do. In this sacrifice his wife gladly shared. But it was hard for them both, and little time was left for family life. The individuality of each of his children was precious in his eves. Yet on that very account he was scrupulously careful not to interfere in their free development. "Sometimes I feel," he wrote last summer, "that I should not try to influence too much the children, — the poet in Austin, the engineer in Ordway, the executive in Anne. Should they not develop themselves?" It was safer perhaps to control family life in the free field of fiction. "I have an idea for certain novels which would contemplate family life from a special angle. execute this plan would mean a study of style and popularization." Novel writing was not exactly his usual business. had never attempted anything of the kind. But this seemed no obstacle to him. He regarded it merely as another "technique" to be acquired. The only difficulty was his desire (already mentioned) not to be popular.

His religion was clear and personal. He had a strong distaste for organized Christianity and worked solidly through his Sundays. But what he considered the essentials of Christianity — among them the crucifixion and its significance — meant a great deal to him. Still more intimate and pervasive was his theism. He hated to talk or hear others talk of such matters in a conventional or hortatory way, or even with emphasis and solemnity. He did not wish to underline his words on any subject, but especially

not on this. The casual, off-hand tone was his favorite; and it was while shifting the logs on our camp fire last summer that he followed up some rather unflattering expressions about "the church deacon type of personality" by suddenly dropping one end of a log and holding his free hand close above his head, with the brisk remark, "But God's always right there, you know." After which he veered swiftly to another topic.

He believed in personal immortality, partly from the influence of his two revered masters, partly from his own experience. "You know I believe in immortality," he said one day. "James's instincts were almost always right." But he did not wish to dwell even on this. "Of course, why not?" he said, when the question of personal immortality was raised in a group of his medical friends. Because it was a matter of course to him. he did not wish to stress it. He used his beliefs but would not boast of them. A healthy mind, he thought, will not pause at such a point. Lazy self-complacency and sanctimoniousness might result. The greater the idea the more instant its demand for activity, for new ideas, new research, new propaganda, such as engaged him up to within a few hours before his death. "In the hot fit of life, a tip toe on the highest point of being, he passes at a bound on to the other side. The noise of the mallet and chisel are scarcely quenched, the trumpets are hardly done blowing when, trailing with him clouds of glory, this happystarred, full-blooded spirit shoots into the spiritual land."

CURRICULUM VITÆ OF E. E. SOUTHARD.

E. E. Southard was born July 28, 1876, son of Martin and Olive Wentworth (Knowles) Southard of Maine, in Boston, Mass.

Graduate (Franklin medallist), Boston Latin School, 1893.

A.B., Harvard College (final honors in philosophy), 1897; M.D., Harvard Medical School, 1901; A.M., Harvard University, 1902. Harvard University chess champion, 1895–96 to 1899–1900. Doctor of science, Georgetown University, 1917.

Student interne in pathology, Boston City Hospital, 1900-01. Assistant in pathology and assistant visiting pathologist, Boston City Hospital, 1901-05.

Student, Senckenberg Institute (Carl Weigert, Director) Frankfort, and at University of Heidelberg, 1902. (Kraepelin's clinics and Nissl's Laboratory.)

Instructor, 1904–05; assistant professor, 1906–09; Bullard professor of neuropathology, 1909–20; and head of the Department of Nervous and Mental Diseases, 1913–20.

Assistant physician and pathologist, Danvers State Hospital, 1906–09.

Pathologist to the Massachusetts State Board of Insanity, later the Commission on Mental Diseases, 1909-19.

Director of the psychopathic department of the Boston State Hospital, 1912–19.

Director of the Massachusetts State Psychiatric Institute under the Massachusetts Commission on Mental Diseases, 1919–20.

Associate Editor of "Archives of Neurology and Psychiatry," "Journal of Nervous and Mental Disease," "Journal of Clinical and Laboratory Medicine," "Journal of Abnormal Psychology," and "Bulletin of Massachusetts Commission on Mental Diseases."

Member of the American Academy of Arts and Sciences, Association of American Physicians, American Association of Pathologists and Bacteriologists, Society of Experimental Biology and Medicine, American Medical Association, American Association for the Advancement of Science, American Neurological Association, American Medico-Psychological Association, National Association for the Study of Epilepsy, National Association for the Study of Feeble-mindedness, New England Psychiatric Society, Massachusetts Medical Society, Boston Society of Psychiatry and Neurology.

In 1906 Dr. Southard married Dr. Mabel F. Austin who, with two sons and a daughter, survives him.

In the war he served as major in the Chemical Warfare Division and as director of the Boston Unit of the Army Neuropsychiatric Training School.

Books: "Outlines of Neuropathology," 1906 (J. L. Fairbanks & Co., Boston); "Neurosyphilis" (with Dr. H. C. Solomon), 1917 (W. M. Leonard, Boston); Shell Shock and Neuropsychiatry," 1919 (W. M. Leonard, Boston); "The Kingdom of Evil," 1920 (to appear).

Monograph: "Waverly Researches in the Pathology of Feeble-mindedness." (Memoirs of the American Academy of Arts and Sciences.)

BIBLIOGRAPHY ARRANGED BY YEARS. 1901.

Southard, E. E. A Case of Glioma of the Frontal Lobe. Medical and Surgical Report, Boston City Hospital, 1901, 138.

REMARKS.

A series of fourteen cases warrants merely qualitative notice. Frontal gliomata, judging from those so far reported, are not large, affect spheroidal shape with ill-defined borders, depend for color upon contained blood (often in normal channels only, but characteristically in areas of infiltration, sometimes in shape of blood-pigment), and exhibit degrees of consistency quite various, but usually firmer in places than the surrounding tissue. Cysts are common. Gross signs of pressure are shown, commonly by flattening of convolutions, by evident bulging, or by internal hydrocephalus and pressure-ring about cerebellum.

So far as origin goes, they occur in the white matter scarcely more often than in the gray; and the crucial cases where ependymal origin is indicated are few (Pfeiffer, Henneberg).

Histologically, the pictures are occasionally quite nondescript (though cases where the resemblance to sarcoma was too close I have excluded). The Spinnenzelle, astrocyte, or what with modern technique is more properly a cell within a sort of cage of fibrillæ, is the characteristic finding. In the absence of fibrillæ there must always remain some doubt as to diagnosis. Examination of sarcoma elsewhere in the body with the anilineblue connective tissue stain always shows a well-marked fibrillar (collagenous) intercellular substance or a reticulum. method it should be possible to differentiate between sarcoma and cellular glioma of the brain. Elements simulating ganglion cells are occasionally found (Baumann-Stroebe, Neurath, Bonome). Lymphoid infiltration of adventitia is found (Buchholz, Southard). Gliosis elsewhere than in the tumor is occasionally found. Pressure-atrophy with loss of myelin is found according to the area destroyed.

The clinical aspects are variable, and, so far as they do not hang upon simultaneous affection (by tumor, by direct or indirect pressure) of the adjacent motor and (on the left side) speech areas, almost uninstructive. Moria (Witzelsucht) and

"cerebellar" ataxia seem the nearest to positive and intrinsic symptoms; but these are certainly inconstant. Perhaps the best case surgically is that of Obici. The most luminous diagnosis seems to be that of Bruns. Here the localized pain and tympany conspired with the ataxia, of cerebellar type, to secure good localization; and the affection of the motor region was a fortunate auxiliary, especially in its slightness. The diagnosis was made of gumma affecting the area afterward found gliomatous.

I may here thank Drs. W. P. Bolles and H. W. Cushing for the clinical records of the case, Dr. J. J. Thomas for suggestions, and Dr. F. B. Mallory for kind supervision of the work.

1903.

BRINCKERHOFF, W. R., and SOUTHARD, E. E. Note upon Erythragglutinins in a Cyst Fluid. Journal of Medical Research, Boston, 1903, IX, 28-32.

SUMMARY.

The cyst fluid exhibits —

- 1. Hetero-erythragglutinins for
 - (a) Rabbit.
 - (b) Dog.
 - (c) Guinea pig (delayed).
- 2. Iso-erythragglutinin for one man.
- 3. No other iso-erythragglutinins in cases examined (no auto-erythragglutinin).

The cyst fluid is capable of developing an anti-erythragglutinin. The patient's serum, though equally hemolytic with the fluid, shows no agglutinative power.

The rabbit erythragglutinin sustains a quantitative relation to the amounts of corpuscles agglutinated.

A definition of the type of agglutinate obtained in work like the above may serve to bring out more clearly the value of the blood corpuscles in the study of agglutinins. The kind of aggregate observed may be shortly termed poikilagglutinate in contrast with the homoagglutinate or rouleau.

Slight acquaintance with the red corpuscles shows that they clump in two forms, in one of which the arrangement might be simply termed streptic, in the other staphylic. But these terms are scarcely definite enough, as further examination shows.

In the streptic type they adhere rim upon rim to form the

coinrows or rouleaux. In the staphylic type they adhere by prominent angles upon surfaces of apposition which are accidental. In the rouleaux the elements preserve to a degree their biconcavity. The corpuscles may remain biconcave in the staphylic aggregates, but they may be variously crenate, vesicular, or otherwise distorted. The elements of a rouleau are alike, whereas the unlikeness in the elements of a tridimensional clump may be striking. Thus the streptic agglutinate and the clump in three dimensions might be more strictly termed, to employ the usual prefixes, homoagglutinate and poikilagglutinate.

Nevertheless, though the elements of a rouleau tend to show biconcavity, the elements of the poikilagglutinate (such as one gets in experiments like the above) may be equally normal looking. Though the streptic agglutinate may be said to depend upon shape of elements with change of surface or change of ambient fluid, the staphylic agglutinate is formed without regard to element shape, consistently with great variety in surface character of its units, and in the absence of its usual medium.

Striking molar changes in surface, certainly involving marked molecular redistribution, are consistent with the constant and regular occurrence of poikilagglutination. But these changes are so many and so various (crenation, vesicularity, distortion, laking tendency) that they can hardly be invoked as the cause or necessary condition of the clumping.

The phenomena of corpuscular clumping thus serve to demolish in a simple manner those theories of agglutination which regard surface changes as the essence of clumping in general. That demolition had indeed been long since practically accomplished; but the blood corpuscles seem an especially fitting weapon.

The foregoing study emphasizes once more the quantitative character of those phenomena of which hemoagglutination is one representative, sets forth a certain advantage in studying the blood corpuscles to make clear the nature of agglutination, and indicates the desirability of further work upon agglutinins and similar principles of natural occurrence in pathological fluids.

SOUTHARD, E. E. A Case of Carcinosis with Secondary Nodule in the Eye. Boston Medical and Surgical Journal, 1903, CXLIX, 287-289.

PATHOLOGICAL SUMMARY AND DISCUSSION.

Anatomically the case shows carcinoma of prostate with extension into retroperitoneal pelvic tissues; carcinoma of intestine, liver, spleen, lung, mediastinum, thoracic cage, pia mater, eye; general arteriosclerosis; chronic interstitial and arteriosclerotic kidney.

Histologically the carcinoma is fairly constantly composed of —

- (a) Smooth masses of cells having indistinct borders and a cytoplasm containing clefts or vacuoles in which lie oval vesicular nuclei with prominent nucleoli.
- (b) A stroma varying extremely in amount from organ to organ. The minor differences are partly ascribable to locus. Thus the finely serrate border found in the liver depends upon the rapid growth of the tumor in the parenchyma of that organ; with this may be compared the smooth lobular growth in the lung. The growths in the pia and in the eye must be grouped together from their tendency to the papillary form. The tendency to hemorrhage shown by the pial growth is remarkable, and is probably due to local compression of the veins. Notable, also, is the choroidal pigment deep in the stroma of the nodule of the eye.

From anatomical and histological evidence alone one would scarcely be warranted in assigning the prostate as the original focus of tumor formation. But the case as a whole—taken clinically as well as pathologically—seems to warrant interpretation as a case of carcinoma of prostate with multiple metastases.

1904.

- Southard, E. E., and Roberts, W. F. A Case of Chronic Internal Hydrocephalus in a Youth. Journal of Nervous and Mental Diseases, New York, 1904, XXXI, 73-80.
- SOUTHARD, E. E. Neuropathology: Outline. J. L. Fairbanks & Co., Boston. (See also 1906.)
- SOUTHARD, E. E. The Central Nervous System in Variola. Journal of Medical Research, Boston, 1904, XI, 298-300. (New series, Vol. VI.)

REMARKS.

The only finding in the nervous system which can be regarded as an essential part of variola is the hemorrhagic tendency sometimes seen in the cortex and cord in variola hemorrhagica. The majority of cases of abscess, meningitis, otitis media with sinusthrombosis, and disseminated myelitis can be safely attributed, in the light of present knowledge, to secondary infection with the streptococcus; but the pneumococcus is occasionally responsible. There is a further series of phenomena the causes of which are obscure; prominent here are aphasia (usually of muscular origin), isolated motor paralyses, neuritis. The most constant nerve finding from the clinical aspect is some degree of delirium, which is, perhaps, best regarded as the delirium of exhaustion. Recovery is here the rule. There seems to be no reported case in which the cortical state can be regarded as the cause of death. In the interpretation of terminal deliria the possible effects of the pushing of alcohol in the treatment must not be forgotten.

SOUTHARD, E. E., and Sims, F. R. A Case of Cortical Hemorrhages following Scarlet Fever. Journal of American Medical Association, Chicago, 1904, XLIII, 789-792.

REMARKS.

The conception of encephalitis has suffered from a dearth of adequate descriptive work. The systematic treatment has, therefore, not kept pace with that of inflammation in other tissues. For example, it was possible to say in 1886 that we can as yet present no unitary picture of processes which culminate in brain softening, if we except those which result from vascular changes. Yet in 1904, in the latest systematic treatise on encephalitis, we hear that recent distinctions of encephalitis into various forms are erroneous, and that all these phenomena can be produced by any appropriate inflammatory agents, among which are numbered the organisms of meningitis and of influenza, embolism, aseptic trauma, corrosive substances and heat. It is probable, however, that further study will make clear a difference in the effects of members of this series of agents.

There are several characteristics of the lesion produced in the brain by bacteria or their toxins which serve to obscure the issue by drawing attention, on the one hand, to the vascular system, and, on the other hand, to the neuroglia. Thus a recent triadic division of encephalitis into 1, purulent; 2, hemorrhagic; 3, hyperplastic, is based on the predominance in the histologic picture of suppuration, diapedesis and hemorrhage, or secondary glia-cell changes. It is, however, probable that all these pictures may be produced by identical agents. The omnipresence of the meningeal and adventitial phagocyte has contributed toward a false unification of the pictures of bacterial and those of mechanical origin.

Herein we have sought to bring out the predominance of hemorrhage and phagocytosis with destruction of cortical tissue, — the focal effect of meningeal suppuration in a case of subinfection with the aureus during convalescence from scarlet fever. The case is one of cortical hemiplegia caught in process, and brings out the now frequently exemplified inflammatory origin of this disease.

HOWARD, F. H., and SOUTHARD, E. E. A Case of Glioma in the Sella Turcica. American Journal of Medical Science, Philadelphia and New York, 1904. (New series, Vol. CXXVIII, 679-686.)

REMARKS.

The report may be summed up as follows: —

A new growth at the base of the cranium gives rise to somewhat characteristic symptoms ending in death after six years. The tumor has gradually filled the interpeduncular space, giving rise in the lower optic apparatus to certain degenerations, a part of which are complete, a part still in process. The brain at large shows little reaction save a subpial gliosis, perhaps incidental to the heightened intracranial tension.

The nature of the growth is in question. The oldest portion of the tumor (judging by the development of the fibrillæ) is in the locus of the posterior lobe of the pituitary gland, which lobe normally contains neuroglia cells developing fibrillæ. The rest of the tumor contains few demonstrable fibrillæ, and could scarcely be differentiated from a sarcoma. It is probably justifiable to classify the case as one of glioma developing in the posterior lobe of the pituitary body. We are not acquainted with previously reported cases of such tumors. Definite proof of the existence of this tumor type can only be brought when some fortunate case shall be dissected showing such a growth in the midst of, or patently growing from, an otherwise normal pituitary body.

1905.

SOUTHARD, E. E. The Neuroglia Framework of the Cerebellum in Cases of Marginal Sclerosis. Journal of Medical Research, Boston, 1905, XIII, 487-498. (New series, Vol. VIII.)

SUMMARY.

The tissues of the human cerebellum show characteristic reactions to injury. There is a line of cleavage in the normal, and especially in the macerating, cerebellum, in the layer known as the layer of Purkinje cells. The cells of this layer suffer the maximum injury both upon impairment of blood supply and in acute diseases like tuberculous and pyogenic leptomeningitis. The death of the Purkinje cells is attended with a loss of their processes, so that the outer or molecular layer also tends to break down. Severer injury destroys not only the Purkinje cells, but also the nerve cells known as the granules of the inner or granular layer. Throughout the varying degrees of such injury cells of the neuroglia series persist. Neuroglia cells are found active in foci which contain no nerve cells.

The neuroglia reaction differs characteristically in the various layers making up a lamina. In the medullary center there is a regular and homogeneous gliosis in which the pre-existent cells produce fibrils which run in no given directions and form a feltwork. In the other layers the neuroglia reaction is regular, but is not homogeneous.

The neuroglia reaction of the marginal layers is such that a quite regular stratification is preserved. The strata of a sclerotic lamina are formed of fibrils running in fairly definite directions. The former line of cleavage is replaced with a line of cells which produce numerous fibrils forming three layers: (1) a layer of fine fibrils lying flatwise to the outer limits of the medullary center; (2) a layer of fine fibrils external and at right angles to these, and also lying flatwise with relation to the medullary center; and (3) a layer composed of coarser radial fibrils running, vertically with respect to the medullary center, out to the connective tissue of the pia mater. Of these fibril systems the first to develop is the mass of radial fibrils known as Bergmann's fibers. It is now possible to doubt the accuracy of Golgi pictures, which make these fibers branch from cells of the inner layers. Their true cells of origin lie along the line of cleavage in a cerebellar lamina.

SOUTHARD, E. E. A Case of Glioma of the Pineal Region. American Journal of Insanity, Baltimore, 1905, LXI, 483-489.

REMARKS.

There are in the literature somewhat over fifty accessible observations upon tumors (and cysts) arising in the pineal region. Of these a few only relate expressly to glioma or gliosarcoma. No plates accompany these accounts, which in the main antedate the neuroglia knowledge of the last decade; and there is no means of divining the intercellular structure from descriptions of cell-pictures which fit the diagnosis equally of glioma and of sarcoma. It is, nevertheless, probable that a number of these cases were truly cases of pineal glioma, and that further undoubted cases will be recorded if interest can be stretched to include a differentiation of the intercellular substances. It is, moreover, plain that, if there be a type of psammoma related to the sarcomata or endotheliomata, there exists in any event also a type of sand tumor belonging to the gliomata.

SOUTHARD, E. E., and KEENE, C. W. A Study of Acute Hemorrhagic Encephalitis (Staphylococcus Pyogenes Aureus). American Journal of Medical Science, Philadelphia and New York, 1905. (New series, Vol. CXXIX, 474-491.)

RÉSUMÉ.

1. The staphylococcus pyogenes aureus produces in the meninges and brain substance of man a type of inflammation in which hemorrhage is prominent.

The picture post-mortem in man varies from red softening or multiple ecchymosis and small abscess to frank and sometimes voluminous hemorrhage. The site of election for the hemorrhagic lesions is the subcortical region, supplied by the long or medullary branches of the cortical vascular system.

The histological picture varies from diapedesis and slight leukocyte emigration to abscess and acutely destructive hemorrhage with phagocytosis. Collections of mononuclear cells phagocytic for cells and cell detritus often quite obscure the acute inflammatory appearance of the lesion.

Six fatal cases in man were examined, all but one, cases of general infection with the staphylococcus aureus.

A history of antecedent disease was the rule. The syndromes,

which were chiefly of sudden onset and rapid course (three to fifteen days), were pyæmic, meningitic, or cerebral in type. The cases of slower course were the most plainly cerebral.

2. The staphylococcus pyogenes aureus produces in the brains of guinea-pigs an inflammatory process which tends to subside within a limited period (two weeks), and, as a rule, remains without clinical signs throughout.

No hemorrhages other than miliary perivascular ones were observed in the guinea pig. The lesions are seldom grossly evident.

The cell pictures are of meningitis (discernible in six hours), ependymitis (twelve to fourteen hours), and exudation into the brain substance (twenty-four to forty-eight hours).

The four and five day cases show numerous cells of the lymphocyte series as well as mononuclear cells phagocytic for exudative cells. Examples of such phagocytic cells have been found as early as twenty-four hours after inoculation.

The exudation into the meninges is discernible earlier, and its traces are demonstrable later, than are the processes in the ependyma and the encephalon; but the meningitis is never so extensive or striking a process as the encephalitis or the choroiditis.

In two weeks to a month there is little sign of the previous infection.

3. The staphylococcus pyogenes aureus, of the strains and in the doses experimentally used, produces in the guinea pig a curable encephalitis, that is a process which in logic is termed reversible. The same organism produced in our human cases extensive brain lesions which surely look as a group irreparable. Perhaps, however, there are in man also certain cases of encephalitis which reverse themselves, and which in their course are taxed with being "functional" diseases and furnish "functional" symptoms during and after tissue repair.

We wish to thank Drs. Mason, Shattuck, Sears and Coolidge for the use of their clinical records, and Drs. Brinckerhoff, Thompson and Wolbach for the anatomical data in their autopsies. Drs. Councilman and Mallory have looked over the histopathological work, and Dr. W. N. Bullard has interested himself in its neurological aspect. The work was done under the Bullard gift to the pathological department of the Harvard Medical School for 1904.

SOUTHARD, E. E. A Case of Cholesterin Stones in the Brain and Cord. Journal of American Medical Association, Chicago, 1905, XLV, 1731-1733.

SUMMARY.

Male of fifty-six years. General and extensive arteriosclerosis, extending to gross involvement of some secondary branches of the circle of Willis. Death from heart failure. Small masses of pure or almost pure cholesterin crystals in several parts of the cortical and central ganglionic gray matter and in the white matter of the spinal cord. Largest mass, 2 centimeters in diameter, in middle of left lenticular nucleus. Thin capsules due to fibrillary overgrowth of neuroglia surround the masses. The relation of cholesterin to miliary glioses in the spinal cord may readily escape attention.

1905, 1906.

Bullard, W. N., and Southard, E. E. A Case of Idiocy in a Child with Cystic Hemispheres. Medical and Surgical Report, Boston City Hospital, 1905, 77-86. Also under title, Cystic Aplasia of the Cerebral Hemispheres in an Idiot Child. Journal of Medical Research, Boston, 1906, XIV, 431-438. (New series, Vol. XI, 272.)

GENERAL SUMMARY AND REMARKS.

- 1. An infant, born in the eighth month of pregnancy, one of twins (the other stillborn), was backward in development, gave evidence of extensive nervous defect, with numerous convulsive seizures, and died, when thirty-seven months old, of bronchopneumonia.
- 2. The autopsy showed gross cerebral changes. The ground plan of the cerebrum was preserved, but the substance of each hemisphere was largely replaced by a closed cystic cavity, independent of the ventricles. The interiors of the cystic cavities were traversed by delicate strands of neuroglia tissue. The pyramidal tracts failed to develop. The cerebellum had developed almost normally.
- 3. The nature and time of the original injury cannot be exactly fixed. The agent was probably focal and just severe enough to destroy the nerve cells or nerve cell producing cells, but leave the neuroglia cell-series intact and capable ultimately of produc-

ing fibrils. The effect of this differential aplasia is that neuroglia tissue alone serves to maintain much of the ground plan of the cerebral cortex.

- 4. Although the original injury may have been quite limited in extent, the failure of cell-processes and whole fiber systems to develop co-ordinately with the expansion of the cerebrum has increased the ultimate loss of solid tissue manyfold.
- 5. It is probable that the cystic chambers in the cerebrum are in part due to the dilatation of perivascular spaces, with eventual rending apart of their walls, as the brain plan continues to enlarge and the neuroglia masses contract. There are phagocytic cells in recesses along the fibrous walls of the cystic spaces. It is not clear whether the neuroglia tissue or one of the brain envelopes is the leading tissue in the enlargement of the brain plan.
- 6. The case showed very little thymus tissue, which was largely overgrown by cells of the connective tissue series. The kidneys were backward in development. There were some peculiarities of the spleen. It is not yet possible to say what part is played herein by the cerebral defect.
- Southard, E. E. A Case of Potts' Disease in the Monkey. Medical and Surgical Report, Boston City Hospital, 1905, 166–171. Also entered in 1906 (exactly same title), Journal of Medical Research, Boston, 1906, XIV, 393–398. (New series, Vol. XI.)

SUMMARY.

- 1. A half-grown pet macacus, autopsied several weeks after onset of paraplegia, showed tuberculosis of the spleen and of the lumbar spine. There were extra dural masses opposite the upper three lumbar vertebræ, together with penetration of the dura and compression of the cord at the second lumbar vertebra.
- 2. The neuroglia fibrils in Macacus cynomologus can be demonstrated well by the use of the phosphotungstic acid hematein method after fixation in Zenker's fluid. The picture approximates that of the human cord similarly treated. The extent and character of the neuroglia changes found in this case suggest profitable lines of experimental work on cellular and fibrillary gliosis in the monkey.
- 3. Areas of secondary degeneration in this case, studied comparatively by the methods of Marchi for fat, of Weigert for myelin, and of Mallory for neuroglia and for connective tissue,

demonstrate active neuroglia changes with new fibril formation in an early stage of secondary degeneration. The fatty degeneration is attended with fibrillary gliosis, the onset of which antedates a demonstrable loss of myelin.

- 4. The connective tissue cells in degenerated nerve bundles in the cauda equina show activity analogous to the neuroglia cell changes found in the cord.
- Bullard, W. N., and Southard, E. E. A Case of Diffuse Gliosis of the Cerebral White Matter in a Child. Medical and Surgical Report, Boston City Hospital, 1905, 19-25. Also under title, Diffuse Gliosis of the Cerebral White Matter in a Child. Journal of Nervous and Mental Disease, New York, 1906, XXXIII, 188-193.

SUMMARY.

- 1. Boy of six and a half years. Measles at three years. One year before death fell backward down three steps in a cellar, with epistaxis, and possibly bleeding from ear. Afterward "nervous." A month later began to stagger in walking, became gradually deaf and stupid, later blind and dumb. Operation for chronic internal hydrocephalus. Death two days after operation.
- 2. The autopsy showed sclerosis of the white matter of the occipital, parietal and temporal lobes on both sides with sclerosis of optic thalami and of small, roughly symmetrical areas in the white matter of the cerebellum.
- 3. The microscopic examination shows a cellular and fibrillary overgrowth of neuroglia, sharply limited to the white matter. The picture gradually varies from that of masses containing giant cells and few fibrils to that of active fibril-producing cell masses or that of stratified areas of inactive fibrillar gliosis.
- 4. The lesion involves the destruction of myelin sheaths and considerable axis-cylinder material. The lesion may be described as a multiform gliosis of the white matter with extensive mildly destructive properties. The nutrition of the areas is maintained. The overgrowth of neuroglia substitutes for, and to some extent destroys, the involved tissues, but fails to invade, in the sense of invasion by glioma. The overlying cortex fails to show important changes. The origin of the condition is unknown.

1906.

SOUTHARD, E. E. A Case of Glioma of the Frontal Lobe with Invasion of the Opposite Hemisphere. American Journal of Insanity, Baltimore, 1905–06, LXII, 561–570.

SUMMARY.

- 1. Man of forty-one, dying ten weeks after onset of symptoms pointing to cerebral disease, showed three apparently discrete nodular lesions of the right frontal lobe, one of which had pierced the pia mater of the longitudinal fissure and invaded the left rostral convolution.
- 2. Examination of the hemorrhagic and edematous tissue of the medullary center beneath the nodules showed bands of tissue like that in the nodules. If the tumor started from one focus in the medullary center, the extent and character of the lesion may be due to rapid growth, unequal along different radii. Thrombosis accounts for the necrotic and cystic center of the mass.
- 3. The tumor is a glioma, rapidly growing and malignant in a sense unusual for cerebral gliomata, in that it invades non-nervous tissue.
- Southard, E. E. Outline of Neuropathology (revised from edition of 1904). J. L. Fairbanks & Co., Boston, 1906.
- SOUTHARD, E. E., and KEENE, C. W. A Study of Brain Infections with the Pneumococcus. Journal of American Medical Association, Chicago, 1906, XLVI, 13-21.

GENERAL SUMMARY AND REMARKS.

The foregoing is a report of cases grouped together as showing effects of pneumococcus brain infection. The clinical and anatomical varieties which they exhibit are only in part explained on present evidence. A long series of cases with parallel differential work on the best bacteriologic lines will be required to settle questions brought up by the various extent and effect of lesions like arteritis and phlebitis, by the varying prominence of polynucleosis and mononucleosis in the meningeal exudate, by variation in the phagocytic properties of the cells involved, and by the varying extent and character of the attendant cellular gliosis.

Clinically viewed, these cases are quite ill assorted. The group includes fulminant and wholly obscure cases; cases not to be told from severe pneumonia; clearly otitic cases; septicemic phenomena; and cases a week old or longer which are clearly cerebral or meningitic in character.

Anatomically viewed, the pneumococcus produces in the meninges and brain substance of man a type of inflammation in which cellular exudation and fibrin formation are prominent.

The picture post-mortem varies from focal or diffuse red softening to purulent leptomeningitis and ependymitis and occasionally abscess formation. The meningeal exudate is almost constant on the convexity. The base is frequently involved, and with the base, often also the ventricles and the cord.

The histologic picture is more various than the anatomic picture. The meninges contain a cellular exudate which varies in the proportion of polynuclear leucocytes and mononuclear cells. Phagocytosis on the part of mononuclear cells for polynuclear leucocytes is best marked in cases in which the mononuclear cells outnumber the polynuclear leucocytes. The meninges in individual cases are fairly constant in the cell proportions found. Fibrin is found about the veins and adjacent to the nerve tissue.

The arteries characteristically show lifting of the endothelium by cellular exudate. The veins often show proliferative changes in the intima with infiltration by polynuclear leucocytes (characteristic in large sulcal veins). Two cases showed mural thrombus formation in the veins.

Seven cases out of twelve showed increase or other signs of change in the neuroglia, especially of the subpial layer.

Penetration of the cortical tissue by polynuclear leucocytes is almost constant.

Orbital inoculations in the guinea pig showed remarkable variety in the results with different cultures. With the cultures yielding positive results a general but not constant tendency is to the production of exudates with a high proportion of mononuclear cells of the phagocytic series. A series of orbital inoculations with culture identical throughout exhibited clearly the same tendency. The exudation of polynuclear leucocytes is primary, however, and may be noted in six hours. The exudate is at its height in three, four or five days, and leaves no trace in from two to five weeks. Ependymitis and encephalitis are not prominent. The guinea pig inoculations, as a rule, produce no clinical sign.

Southard, E. E., and Stratton, R. R. A Study of Acute Leptomeningitis (Streptococcus Pyogenes). Journal of American Medical Association, Chicago, 1906, XLVII, 1271-1277.

GENERAL SUMMARY AND REMARKS.

Cases of streptococcus brain infection are of interest in comparison with the cases of pneumococcus brain infection described last year. The main results may be stated in connection with those of the pneumococcus study.

As with the pneumococcus series, the questions of main interest are brought up by the varying extent and effect of lesions like (1) arteritis and phlebitis, (2) the cellular infiltration of the meninges with its variation in respect to phagocytosis, and (3) the attendant cellular and, in certain cases, fibrillar gliosis.

Clinically viewed, the cases are of various duration and run a trifle longer than the pneumococcus cases. The relation of streptococcus meningitis to lung lesions is less suspicious than that of staphylococcus or pneumococcus brain infections to lung lesions. The part played by lung lesions in bringing about meningitis has probably been overestimated. The streptococcus cases seem to be more pronouncedly "cerebral" or "meningitic" from the very start of acute symptoms than are the pneumococcus and staphylococcus cases, which are a little more "primary."

Anatomically viewed, the streptococcus cases preserve their resemblance to the pneumococcus cases, even to the production in some cases of small abscesses. Particular attention may be called to the case simulating meningitis serosa (Case 4). It would be well to review the cases of this disease to be found in the literature, and exclude those without bacteriologic examination.

Considered histologically, the streptococcus cases again resemble the pneumococcus cases. The same relations of bacteria to leucocytes, of leucocytes to cells of the macrophage type are shown in the two series. The intimal infiltration of the arteries and the intimal proliferation and exudative lesions of the veins run parallel in the two cases. The occurrence of early fibrillar gliosis (in the sense of the production of new fibrils by the swollen neuroglia cells) is important. The interpretation of early fibrillar gliosis is not easy, since it is necessary to exclude ex-

traneous causes (old age, arteriosclerosis, chronic active lesions) for its occurrence.

An extensive series of guinea pig inoculations, which need not be reported in detail, confirmed the main result, viz.: the parallelism in action of the two organisms, pneumococcus and streptococcus. Orbital inoculations simultaneously in numerous animals with histologic examination of animals killed on successive days were employed as in previous work. The inoculations of the strains used, as a rule, produced no clinical sign, despite the suppuration present. As in the human cases, each of the lesions found is apparently wholly curable taken by itself.

The reversible character (to use a phrase from books of logic) of the phenomena is shown in the strikingly various pictures presented by the exudate in Case 9 taken from the vertex downward.

Indeed, it is rare to find in streptococcal, as in other forms of acute leptomeningitis, any single lesion which is necessarily incurable. It is probable that in many cases the patients die of toxemia. This toxemia may vary with the extent of the exudate. The amount of exudate which we see at an autopsy may mislead us in our idea of the proportions of the toxemia, since wide reaches of the pia mater may be sterile, though other parts contain multiplying organisms. Differential studies of the exudate in several places are essential if we are to get a fair sample of the conditions. Such studies might readily assume clinical importance.

The early glioses found in several cases are of some importance both in general and clinically. These glioses will be best considered in connection with those in tuberculous meningitis in a subsequent paper.

Ruston, W. D., and Southard, E. E. Cerebral Seizures with Suboccipital Pain; Miliary Cerebral and Gross Vertebral Aneurysms. Boston Medical and Surgical Journal, 1906, CLIV, 312–314.

1907.

SOUTHARD, E. E., and Hodskins, M. B., General Encephalomalacia. (Abstract.) Journal of Nervous and Mental Disease, New York, 1907, XXXIV, 267-268.

REMARKS.

The speakers proposed to define a type of soft brain differing, on the one hand, from encephalomalacia, due to plugging of vessels, and, on the other hand, from autolytic softening of postmortem origin. They termed the condition general encephalomalacia. The condition is characterized by (1) diffuse axonal reactions in many types of cell; (2) diffuse fatty degeneration demonstrated by the Marchi method; (3) absence in increase of weight (important in distinguishing grossly from edema); (4) absence of exudative changes.

Epileptics are somewhat prone to exitus with soft brain. The condition seems to be associated with a terminal exhaustion. The illustrative case, that of an epileptic dying at forty-two, was of importance in that it showed the same histological changes in the midst of a sclerotic area as were shown by the remainder of the brain and cord. Thus the lysis, while it appears to be a general histolysis, is actually a differential cytolysis or axonolysis. Enlargements were shown from photomicrographs of axonal reactions in various types of cell from the illustrative case.

- Southard, E. E. Late Epilepsy in a Woman over Sixty Years of Age. (Abstract.) Journal of Nervous and Mental Disease, New York, 1907, XXXIV, 399. Also as under the title, Diffuse and Focal Lesions in a Case of Late Epilepsy. Transactions, National Association for the Study of Epilepsy and Care and Treatment of Epileptics, 1906, IV, 131-145.
- Collins, A. N., and Southard, E. E. Gliotic Cyst of the Right Superior Parietal Lobule. (From the Laboratories of the Boston City Hospital and the Danvers Insane Hospital.) American Journal of Insanity, 1907, LXIV, 299-304.

REMARKS.

We have to deal in the present case with a condition of cyst with gliosis in the right superior parietal lobule. The cyst was 2.5 centimeters in diameter, and did not communicate with

the lateral ventricle. The origin of the cyst comes in question.

We are able to do no more, perhaps, than enumerate possibilities.

Without reference to the subject's history we might propose that this condition of gliotic cyst could be labeled anatomically as follows:—

- 1. Agenesia, defining a condition in which the original tissue had never been deposited in embryonic life.
- 2. Aplasia, defining a condition in which the original elements laid down in this focus failed to develop for some reason.
- 3. Necrosis of focal character, defining a condition in which the necrotizing agent destroyed cells which had normally developed. Under this head might be considered
 - (a) Infarction of embolic or thrombotic origin.
 - (b) Hemorrhage with absorption and incomplete repair.
- (c) Abscess, tubercle, gumma or other infective lesion, followed by absorption of disease products without adequate replacement with scar-tissue or gliosis.
 - (d) Echinococcus disease.
- 4. Tumor formation with cystic degeneration (cystic glioma or gliosis with cyst formation).

The history of the subject fails to support several of the possibilities mentioned, and indeed seems inconsistent with a number of them. Perhaps the earliest symptoms were due more to heightened intracranial pressure than to the focal lesion. The greater emphasis at times of right parietal headache might be ascribed to the focal lesion. In any event, the results of the focal lesion and the results of the consequent increase of intracranial pressure can hardly be separated clinically at this time.

The woman had been perfectly normal up to the onset of her disease six years before death. She had been a capable trained nurse. Clinically there could be no suspicion of maldevelopment, or of any form of bacterial or parasitic infection.

Disregarding the clinical data for the time being, we are in a position to exclude the likelihood of most of the possible conditions mentioned above. The absence of vessel lesions and of phagocytic cells is striking. The normal character of tissues a few millimeters distant from the gliotic wall of the cyst is suggestive of an acquired, rather than of a congenital, lesion.

We have thought it worth while to present the case as a phenomenon to be explained. No explanation seems so satis-

factory as that of glioma with cystic degeneration. This diagnosis fails, however, to explain much, since the significance, both of glioma and of cystic degeneration, remains unclear. suggestion we can offer is that the condition is analogous to syringomyelia. Gliotic cysts of the cerebrum will be understood when syringomyelia is understood. Both conditions depend for their explanation upon the theory of neuroglia changes. nerve tissues of a part of the superior parietal lobule in this case undergo a slow death like that in the tissues of the posterior horn of the spinal cord in a case of syringomyelia. Vascular lesions The neuroglia attempts to fulfil the function fail to ensue. usually attributed to it, — replacement-gliosis. The attempt is a failure, as in the banal condition of cerebral infarction, and a condition grossly resembling a cyst of softening follows. Alterations in the amount of enclosed liquid ensue, just as in syringomyelia, and effect alterations of symptoms, complicated, however, to an extent not possible in syringomyelia, by heightened intracranial pressure.

Just as in syringomyelia, it is perhaps not possible to allege that the destruction of nerve elements in the area which afterwards becomes cystic is a primary or direct destruction of nerve elements. Is it possible that the gliosis is primary and not wholly a replacement-gliosis?

Further cases may determine whether there is a cerebral disease which proceeds on the lines of syringomyelia.

- SOUTHARD, E. E. Lesions of the Granule Layer of the Human Cerebellum. Journal of Medical Research, Boston, 1907, XVI, 99-116.
- SOUTHARD, E. E. On the Mechanism of Gliosis in Acquired Epilepsy. American Journal of Insanity, Baltimore, 1907–08, LXIV, 607–641.

SUMMARY.

The theory of epilepsy expounded in the present paper is founded mainly upon structural considerations. The histological data have been interpreted largely from a functional point of view. The theory lays claim to some originality in two directions, in setting forth, namely, the properties of a typical epileptogenic focus in the cerebral cortex, and the nature of that change in cortical tissue which favors epileptic discharges. The charac-

teristic feature of a typical prime focus is described as the separation of a normal cell-group from its normal control by other cell-groups, and the impact upon the receptive surfaces of these normal cells of a steady, intimate, abnormal pressure, both segregation and compression effected by neuroglia overgrowth. That feature of cortical tissue which favors the spread of epileptic discharges is described as due to a simplification of cell arrangements, arising in the destruction of controlling elements with maintenance of motor elements. In the production of both prime focus and the abnormal tissue which permits uncontrolled discharge, the neuroglia tissue plays a characteristic part — exerting an active continued pressure in the first instance, and readily permitting lateral discharges and the activation of great groups of motor cells in the second instance. In the former case we see a fresh example of the irritative property of heightened tension - only here exhibited quite in miniature. In the latter instance we are dealing with conditions of still greater theoretical interest, approximating, though with diverse outcome, the loss of insulation seen in foci of disseminated sclerosis. The findings suggest the widely different effects upon nervous tissues of active and of quiescent gliosis.

From a review of pertinent literature, it appears that physiological interest is converging upon the field here considered. Fiber-tract studies have failed to cope with other problems than those of linear transmission along well-insulated paths. Only in the case of multiple disseminated sclerosis and certain studies in interstitial neuritis have the occurrence and nature of lateral discharge from fiber to fiber and the effects of intimate fiber pressure been considered. And in these instances it may well be proposed that a fresh abnormal type of synaptic tissue has been provided. Physiological interest is now leveled upon the synaptic tissues in general. And, if a synapse is a physical surface of separation between neurones, it is serviceable to inquire what are the conditions which can readily modify the synapse. roglia tissue, formerly regarded as purely supportive in function, here rises to a high scale of importance. The present essay points out two effects of gliosis upon synaptic tissues, the one active irritative one, the other a passive effect. A review of the fundamental views of Hughlings Jackson serves to demonstrate the perfect generality of epileptic phenomena at all levels, and makes clear why the writer sought knowledge about epilepsy in organic cases. If the writer advances a case in which the prime

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epileptogenic focus consists in an active gliosis within a space of 1 cubic centimeter in the cornu ammonis, he cannot be charged with holding that all cases of epilepsy are so brought about. He describes what he regards as a typical prime focus. He conceives fundamentally that similarly forcible and lasting stimulation of a receptive surface, standing in important relations to the motor system, might produce epileptic convulsions just as effectively as the gliosis he describes. In this sense complex emotions or intestinal worms might conceivably stand in as effective a relation to the nervous system as the intimate pressure of early gliosis upon the expansions of elements whose currents eventually play upon the muscular system.

Wholly distinct from these considerations about epileptogenic foci are those points which are developed concerning tissues facilitating discharge. A review of various authors discovered much difference of opinion and considerable interpretation of phenomena as secondary. The phenomenon of gliosis has not escaped numerous observers, among them the very observers that have emphasized the alterations of the second cortical layer as important in epilepsy. But this gliosis has been regarded as secondary, and our attention has been diverted rather to certain cell and nuclear characters which are looked upon as specific. The writer has been tempted to regard these nerve-cell changes as vegetative, and at any rate as not further analyzable, but to accept them as examples of a lesion which will interfere with normal control of muscular elements. The cases presented here go far to prove that the nerve cells of the outer layers are the first to disappear in cases of atrophy, and even along the edges of ischemic areas. The tendency to the formation of tissue favorable to epileptic discharge is, according to this view, a somewhat general tendency in cerebral tissue so long as the destroying forces stop short of the motor elements and permit any communication, however slight, between the motor elements and the receptive side of the body. A reduction or simplification of the system through destruction of the smaller elements of the cerebral cortex procures new reflex arcs with fresh surfaces of separation which are perhaps even simpler and more automatic than the spinal arcs and synapses. The peculiar features of the epileptic discharge depend upon the inertia of currents travelling in simplified arcs, and upon the lack of energy-absorbents en route. The cerebral arcs normally escape automatism through a multitude of synaptic connections; under epileptic conditions the cerebral mechanism approaches in fatality the spinal mechanism. Under this conception epilepsy and phenomena like clonus are readily perceived to belong to a single logical group.

The phenomenon of epilepsy, in short, requires the intactness and even the normality of some well-defined route from stimulus to muscles. If we conceive the stadia of this route set end to end, with the cerebral synaptic tissue in the middle, we perceive that toward the two ends of the linear series it becomes increasingly difficult to provide conditions which will produce generalized and spreading convulsions. Destruction of elements at any point in the route should at first sight exclude the production of epilepsy. And so, in most cases, the destruction of the efferent paths will exclude epilepsy. In the afferent paths, however, the very process of destruction often constructs new and potent surfaces of stimulation which act as epileptogenic foci; and, in the cerebral synaptic tissue, the strata are so constructed that the loss of smaller, central, modifying and inhibitory elements is effected prior to the loss of the major elements which are essential to the intactness of the great route. And these major efferent elements can themselves be subject from time to time to stimulation afforded by the contractile energies of growing neuroglia. Epileptogenic stimuli are applied in all cases to those elements having a forward direction, so that the reaction is in most cases, if not necessarily, a sensorimotor reaction in Hughlings Jackson's sense.

What are the applications of this theory to the phenomena of idiopathic epilepsy? In certain cases of idiopathic epilepsy there seems to be grave doubt whether any adequate epileptogenic foci can be discovered. There is more hope that tissues favorable to epileptic discharge shall be discovered, if the proper methods are employed.

We can see some reason for the absence of effective foci in hereditary cases, particularly if we bear in mind the epileptic offspring of Brown-Séquard's injured guinea pigs. With the onset of topographic and stratigraphic knowledge of the cerebral cortex we shall approach more nearly to a definition of tissues suitable for the propagation of epileptic discharges. So far it seems that such synaptic tissues are characterized by abnormally simplified arcs whose impulses are the more automatic through the lack of countercurrents from surrounding cells. Whether we are to look in inherited serum properties for the production of such conditions, the future will decide. Destroying agents of moderate power tend to alter tissues in this direction.

GAY, F. P., and SOUTHARD, E. E. On Serum Anaphylaxis in the Guinea Pig. Journal of Medical Research, Boston, 1907, XVI, 143–180. (New Series, Vol. XI.)

Conclusions.

- 1. The well-known susceptibility to intoxication by horse serum, which is demonstrable in guinea pigs previously injected with horse serum, is due to the non-neutralization and non-elimination by the animal body of a factor in the serum, for which we suggest the name anaphylactin. The intoxication caused by the second injection depends upon factors of the serum other than anaphylactin. These factors correspond to constituents of the serum eliminable by the animal body. The reaction of intoxication would seem to be a cellular one, dependent upon a heightened power of assimilation on the part of cells which have been subjected to the anaphylactic substance over a definite period of incubation.
- 2. The tissues of guinea pigs, examined during the anaphylactic phase, show no characteristic lesions. Striking multiple hemorrhages, for some reason hitherto undescribed, accompany the toxic phase. The hemorrhages are more frequent in the stomach, cecum, lungs and heart than elsewhere.

Microscopic study demonstrates that the hemorrhages are largely associated with widespread fatty degeneration of the capillary endothelium. The heart muscle, the voluntary muscle, the peripheral nerves and the gastric epithelium show striking focal fatty changes which are independent of the vascular lesions.

The task of the anaphylactin is apparently so to prepare various cell structures that their contained fat is made to flow rapidly together upon exposure to the toxic agent. The rapidity of this degeneration is striking, though it presents histologically the features of so-called "chronic" degeneration.

SOUTHARD, E. E. and Hodskins, M. B. Note on Cell Findings in Soft Brains. American Journal of Insanity, Baltimore, 1907-08, LXIV, 305-310.

REMARKS.

The anatomist is prone to neglect the general feel of the brain and cord at autopsy. He is familiar enough with focal alterations of consistence; thus, with foci of induration (scars, focal glioses) and with foci of subnormal consistence (focal encephalomalacia, focal encephalitis). A state of general induration is recognized as due to diffuse fibrillar gliosis. General reduction of consistence is least easy to interpret.

The plastic softness and swelling of edematous brains may be told from the diffluence of brains as autolyzed post-mortem. We have here noted a condition of general encephalomalacia which we take to be of ante-mortem origin, though doubtless it is speedily emphasized by post-mortem changes.

The soft brains and soft cords of this group are not produced by vascular lesions, and, unlike edematous organs, show no essential increase of volume or weight. This type of general encephalomalacia (myelomalacia) seems not unlike the state of the brain and cord after post-mortem autolysis, and is possibly due to a similar process.

Although the process has the appearance of a general histolysis, yet histological study shows that the lysis is essentially differential (diffuse axonal reactions in nerve cells and still more diffuse Marchi degenerations). Where, as in the illustrative case, a focal induration also occurs, the histolysis is readily seen to be differential because the nerve cells and fibers which still live in the sclerotic focus are subject to the same cytolyses (axonolyses) as are the cells and fibers of the brain at large. What the lytic agent is remains obscure.

General encephalomalacia (myelomalacia, neuromalacia?) is clinically related with a late, terminal, or agonal exhaustion, and is sometimes seen following epilepsy as well as in other conditions.

1908.

Bullard, W. N., and Southard, E. E. A Case of Syringal Hemorrhage complicated by Meningitis. (Abstract.) Journal of Nervous and Mental Disease, New York, 1908, XXXV, 37.

REMARKS.

The readers interpreted the data of this case as illustrating the following series of events: (1) gliosis with cavity formation in the spinal cord; (2) hemorrhage into cavity with defects tantamount to those of transverse myelitis; (3) extensive decubitus with erosion of bone and exposure of spinal canal; (4) ascending meningitis.

MITCHELL, H. W., and SOUTHARD, E. E. Melancholia with Delusions of Negation: Three Cases with Autopsy. Journal of Nervous and Mental Disease, New York, 1908, XXXV, 300-314.

GENERAL SUMMARY AND REMARKS.

The disease group melancholia has a somewhat precarious footing in present-day psychiatry. The purest cases appear to occur in or about the climacteric era. The practical alienist is always reluctant to place a case in the group melancholia lest it shortly transpire that the case should rather have been counted senile or arteriosclerotic, or, in some other way, frankly organic. Moreover, it frequently appears that error may creep in the opposite direction, and the patient, alleged to have melancholia, turn out to be actually a victim of some constitutional defect or of some acute psychosis.

We have found difficulty in resolving our ideas about the disease group melancholia, and were for a time inclined to believe that any given case could perhaps be transmuted, as a matter of diagnosis, into some other group.

As a beginning in this group we have here introduced three cases which, whether they fit any acknowledged grouping or not, appear to have certain features in common as well as certain instructive differences. The psychological color and, to some extent, the course of these cases recall some features of Cotard's syndrome.

In every case there were a few established instances of insanity in the direct line on one or other side. The hereditary features, interesting in each case, appear to have little in common except the terminal continuous depressions in the mothers of two patients (Cases II and III).

The lives of the three patients showed little which can be regarded as underlying their ultimate conditions. Case I used no alcohol, Case II drank beer with meals, Case III used alcohol moderately. Venereal history practically negative in all cases.

Occupations: clerk, I; mason, II; shoemaker, III.

Previous diseases: lumbago, I; pneumonia seven years before commitment, II; scarlet fever and purulent otitis media, æt. 3, and typhoid fever and la grippe with delirium, æt. 61, III.

Ages at onset: 48, I; (69) 75, II; 65, III.

Durations: 8 months, I; (8 years) 2 weeks, II; 24 weeks, III. Onset: gradual, I, III; sudden, II.

Assignable causes: financial worry, I; senility and domestic worry, II; nothing, æt. 65, III.

Physical conditions: arteriosclerosis in all cases; Case III showed emaciation, nephritis, cystitis, increase of reflexes.

Mental states: ideas of negation in all cases, developing in Case I after slowly increasing depression and agitation with delusions about self and family and questionable hallucinations; in Case II, after gradual senile failure, as sudden deep depression with agitation, delusions of ruin of self and family, and suicidal attempt; and in Case III, after slowly developing hypochondriacal depression.

The feelings of unreality and ideas of negation presented a certain variety in the three cases. Case I showed an alteration of personality, uttered frequently in such phrases as "I'm all gone. I'm dead to the world. I'm not G. E. H. I've made myself as Gibbs. I've been here as G. E. H." Case II showed a feeling of unreality, both as regards the outer world ("sunlight not real, sky not blue, people not real human beings") and as regards himself ("I can't move. I can't die"). Case III showed an alteration of point of view as to the outer world ("You're all great big men, and so strong; you must weigh over 400 pounds") and nihilistic ideas ("I am so small you can't see me. I've got no brains, and I can't talk. I've got no heart, and no stomach, and I can't swallow. I wouldn't burn if you threw me in the burning furnace").

The anatomical side of these cases presents several common aspects, but little which promises to explain the disease. Arteriosclerosis, when confined to the large branches of the circle of Willis, can scarcely be invoked as underlying symptoms of such specialized character as those under consideration.

Just as the patients showed strikingly little in alterations of reflexes (increase in Case III), so the brains showed strikingly little in the shape of gross or focal alterations (small old cyst of softening in Case II and mild chronic exudative process in Case III).

Moreover, the brains gave little evidence of general or focal atrophy. No striking alterations in cortical topography and arrangement of layers could be detected on microscopic examination. Pigment-bearing cells in perivascular spaces were constantly found; and, in default of any suspicious localization of these, we must attribute them rather to the results of advancing years than to a special factor.

Neuroglia cell pigmentation was also quite constantly found; but this was not so universal in distribution as was the case with the perivascular cell pigmentation. Common to all three cases was a neuroglia cell pigmentation in the intermediate layers of the areas of cortex examined. The relation of the neuroglia cell pigmentation to cortical activity could not be made out. Satellite-cell pigmentation was not constant.

Nerve cell pigmentation was constantly found in the elements of moderate size in all parts of the cortex examined. This pigmentation was strikingly brought out by the use of iron hematoxylin. The pigmentation in question has a somewhat characteristic locus in the affected cells, fails to destroy their contours, and lies apparently in interstices in the cells. This interstitial nerve cell pigmentation, as brought out by iron hematoxylin, is to be sharply distinguished from the familiar yellow sack pigmentation of the major elements.

Pending the increase of knowledge concerning the pigments and fat-like deposits in general, we can at least investigate their occurrence topographically. It seems to us that however fragmentary the present findings are, and however far we may be from bringing such findings into relation with disorders of apperception, we have at least a promising field for investigating the conditions of what seems to be a truly cortical disorder. We are at present at work upon accessible cases of melancholia.

- GAY, F. P., and SOUTHARD, E. E. Further Studies in Anaphylaxis: I. On the Mechanism of Serum Anaphylaxis and Intoxication in the Guinea Pig. Journal of Medical Research, Boston, 1908, XVIII, 407-431. (New series, Vol. XIII.)
- GAY, F. P., and SOUTHARD, E. E. Further Studies in Anaphylaxis: II. On Recurrent Anaphylaxis and Repeated Intoxication in Guinea Pigs by Means of Horse Serum. Journal of Medical Research, Boston, 1908, XIX, 1-4. (New series, Vol. XIV.)
- GAY, F. P., and SOUTHARD, E. E. Further Studies in Anaphylaxis: III. The Relative Specificity of Anaphylaxis. Proceedings, Society of Experimental Biology and Medicine, New York (Conclusions only), 1907–08, V, 83. Also in Journal of Medical Research, Boston, 1908, XIX, 5–15. (New series, Vol. XIV.)

Conclusions.

The anaphylaxis in guinea pigs caused by the previous injection of any one of the protein substances - horse serum, egg white or milk — is only relatively specific. The maximum reaction on second injection is always obtained when the substance which has sensitized is used, but in certain combinations intoxication can be produced by the other two substances. intoxication by a heterologous proteid is "partial," and does not occur if the "complete" intoxication produced by the homologous proteid has been effected. When partial intoxication has been produced by one or both of the heterologous substances, complete intoxication may still be effected by the homologous substance. The intensity of an homologous intoxication, after anaphylaxis by a single substance, would seem to depend somewhat on the substance used, the order of toxicity ranging, egg white, serum, and last of all milk. After combined anaphylaxis, produced by initial injection of all three substances, the first intoxication, allowing of course a proper incubation period, may be produced by any one of the substances in question. When intoxications are effected with each substance in turn, the serial set of symptoms varies according to the order in which the substances are injected on the subsequent days. When injected as the second or third of the series, egg white alone produces maximal symptoms at all times. Horse serum is diminished in toxicity if used after either egg or milk, and has lost markedly if used after intoxication with both substances. Milk is very slightly toxic if given second in order, and absolutely non-toxic if given third. This would compare with the actual toxic power of each substance as noted after homologous sensitization.

The mixed anaphylaxis, moreover, is only relatively specific, since egg and horse serum will completely pre-empt the possibility of intoxication by milk if this substance is given last.

GAY, F. P., and SOUTHARD, E. E. Further Studies in Anaphylaxis: IV. The Localization of Cell and Tissue Anaphylaxis in the Guinea Pig, with Observations on the Cause of Death in Serum Intoxication. Journal of Medical Research, Boston, 1908, XIX, 17–35. (New series, Vol. XIV.)

Conclusions.

The results of this work are in part confirmatory of our previous results, and consist in part of novel data.

Eighty-five per cent of guinea pigs which, after sensitization with horse serum and intoxication by a second dose of horse serum, die in the critical phase, or are killed within twenty-four hours of the second injection, exhibit macroscopic hemorrhages in one or more organs. The stomach leads the other organs in frequency of involvement (58 per cent); the lungs stand next (40 per cent). Three unusual localizations of hemorrhage, not noted in our previous paper, are brain, spinal cord, peritoneum.

The cause of death, when it occurs, is respiratory. Respiration ceases in the inspiratory phase, and shows itself anatomically and histologically as emphysema. Death does not occur, as a result of this disease, except in a critical phase, which occupies at most one hour.

The most striking functional feature of the critical phase, after the second or toxic injection of horse serum, is severe diaphragmatic spasm. The spasms are often accompanied by similar shock-like spasms of the accessory inspiratory muscles and of other trunk and limb muscles.

The most rapid deaths are produced by intracarotid, intrajugular, post-orbital, and paraneuraxial injections. The occurrence and rapidity of death in the critical phase, as well as the severity of respiratory symptoms throughout the toxic phase, appear to vary with the nearness of the toxic injections to the respiratory central apparatus.

A new line of research is opened up by the paraneuraxial injections of horse serum in sensitized guinea pigs. These seem to prove that differential irritative and paralytic reactions can be secured by small localized injections of horse serum adjacent to various parts of the sensitized central nervous axis.

Severe respiratory symptoms can be produced in sensitized (but not in normal) guinea pigs by local applications of horse serum (not by salt solution) to the exposed vagus. This is interpreted to signify a conveyance of impulses over at least three neurones to the diaphragm, that is, to the medulla, thence to the phrenic center, and thence to the diaphragm. We have not produced death by these vagal applications of horse serum.

To explain these respiratory symptoms, we offer an hypothesis of local tissue anaphylaxis expressed in a relatively specific sensitization of the respiratory centers. We regard as unfounded those hypotheses which consider the respiratory (and other) centers and tissues as unaltered in the anaphylactic or sensitizing

phase, and which allege the manufacture of antibodies in the blood serum which later unite with the second dose of horse serum to form new specific respiratory toxines. We regard this change induced in the respiratory centers as of a physical rather than a chemical nature, so far as this distinction is of importance in this connection.

Neither hemorrhage nor respiratory death is an indispensable feature of this disease. Some guinea pigs show no hemorrhages. Some show slight symptoms. The hemorrhages do not vary in frequency or extent with the severity of the symptoms in all cases.

But all guinea pigs so far examined in the toxic phase do show focal fatty changes in many tissues of several genetic types. These changes are, in many regions, of an extremely focal character, involving often a single muscle fiber, nerve fiber, or other cell, as the case may be. The toxic phase is characterized by focal cytolyses of wide distribution. Except in areas of hemorrhage (where local mechanical destruction complicates findings), and in certain diffuse fatty changes in the gastric epithelium (where the local action of the gastric juice may come in play), groups of contiguous cells are not characteristically affected by fatty change — focal histolysis is not the rule.

And, if focal cytolysis (rather than focal histolysis) is the rule in the toxic phase, then it appears that the work of the anaphylactic phase is to sensitize cells in a variable degree (rather than to sensitize several contiguous or regionary cells in a like degree).

Southard, E. E. and Richards, E. T. F. Typhoid Meningitis: Cultivation of Bacillus Typhosus from Meninges and Mesenteric Lymph Node in a Case of General Paresis, with a Note on Experimental Typhoid Meningitis in the Guinea Pig. Journal of Medical Research, Boston, 1908, XIX, 513–531.

Conclusions.

The points of the paper are as follows: -

1. A classical case of taboparesis, with previous history of syphilis, but without history of typhoid fever, succumbs after a week's acute illness to broncho-pneumonia and to purulent cerebrospinal meningitis.

- 2. A typical strain of Bacillus typhosus was isolated in pure culture from a swollen mesenteric lymph node and from the meningeal pus. The blood failed to yield Bacillus typhosus. There were no typhoidal lesions in the intestines.
- 3. The meningeal exudation contained polynuclear leucocytes in great numbers. This finding, in connection with the older findings of Ohlmacher, W. G. MacCallum, and Henry and Rosenberger, leads to the hypothesis that Bacillus typhosus within the meninges may exert a directly pyogenic action. Should this hypothesis be upheld, the direct action of the bacillus stands in sharp contrast to the proliferative effects of the typhoid toxine described by Mallory in the intestine, lymph nodes and elsewhere in the viscera. The indications are, therefore, that Bacillus typhosus may have two separate effects, the one produced by a diffusible toxine (Mallory) characteristically in the intestinal tract, and the other produced in the meninges either by direct local action of the bacilli or through an endotoxine, due to destruction of the bacilli.
- 4. In confirmation of the results of Tictine, Bacillus typhosus was experimentally found to inflame the meninges of guinea pigs. In accordance with the hypothesis stated above, guinea pig brains proved to show an exudation containing many polynuclear leucocytes. Mononuclear elements arrive by the seventh day after inoculation.
- 5. Research is desirable to determine whether the local action of Bacillus typhosus in the meninges is, or is not, of endotoxic type.
- Southard, E. E., and Ayer, J. B., Jr. Dementia Præcox, Paranoid, associated with Bronchiectatic Lung Disease and terminated by Brain Abscesses (Micrococcus Catarrhalis). (From the Laboratory of the Danvers Insane Hospital.) Boston Medical and Surgical Journal, 1908, CLIX, 890–895.

DISCUSSION.

We have presented the case of an American youth of average capacity, a chair maker for some six years, who became insane (depressed, paranoid, suicidal, later at times katatonic) after facial disfigurement in a Fourth of July accident at the age of twenty-five. We were tempted to a more particular study of this case because of the clear-cut features of an autopsy five years after onset (chronic and acute lung disease with abscesses, mul-

tiple abscesses of other organs, including the brain), which seemed to point to bronchiectases and lung disease of ancient date.

The clinical history and the autopsy findings are so far consistent that a "psychogenic" origin for this case of (possibly) dementia præcox can be safely discounted. It seems safe to conclude that the lung disease was already in process of production in the six months subsequent to the episode of facial disfigurement. It is possible that this disease antedated the facial injury, and that masses of bacteria in dilated bronchi had begun to affect the patient long before frank pulmonary signs set in.

However this may be, the lung disease, whose progress was carefully followed on account of its clinical resemblance to pulmonary tuberculosis, had a peculiar effect upon the course of the mental symptoms. Both lung disease and mental disease came in attacks, but these attacks did not coincide in time.

The lung disease would affect in each attack a fresh area, and was characterized by exhaustion, bloody and purulent expectoration (no tubercle bacilli) and high fever.

During the toxemic phases of the lung disease the patient was quiet, but would yield depressive delusions on questioning. Just as earlier the patient had been depressed ostensibly on account of his disfigurement, so throughout his disease he tended to delusions concerning his somatic condition. ("This is leprosy I am spitting up.") But his delusions were at all times of wider range than his bodily disease ("given up by God," "world is degenerating," "murdering the whole world"), and were sometimes of extreme metaphysical ingenuity ("passed both ends of the world and got behind everybody").

After some years the paranoid picture had become emphasized by mild and episodic katatonic features (wild beast simulations, mannerisms and peculiar contortions).

It is, of course, possible that the lung disease and the mental disease are merely interpenetrating entities in this case. The autopsy showed that the brain, in common with the kidneys and the spleen and other structures, had undergone abscess-formation. There is, however, no evidence that the brain abscesses were of long standing, and, though the fatal issue was pyemic, it is probable that previous attacks had been merely toxemic, or, at most, mildly septicemic. The microorganism engaged in the abscess-formation is not in all respects well defined, but seems to

belong to the *micrococcus catarrhalis* group. There is no convincing evidence that this organism was in any way responsible for the clinical features of the disease as a whole, but it seems not easy to exclude, in a more general way, the presumably highly toxic masses of bacteria and detritus in the pulmonary tissues from the field of factors in the mental disease.

Just as it has long been suspected by some workers that there is a somewhat close relation between lung disease and brain disease (and, in particular, between bronchiectases and brain abscesses), so there may possibly obtain a more delicate and elusive connection between toxic lung conditions and brain conditions. It would be of extreme value could we learn more precisely the paths taken by bacteria and toxins from the lungs to the central nervous axis.

SOUTHARD, E. E., and RICKSHER, C. A Complicated Case of Brain Tumor. American Journal of Insanity, 1908, LXIV, 695-702.

CLINICAL SUMMARY.

It is extremely difficult to ascribe the various symptoms to definite lesions. The pontine lesions are of such a degree that they might easily modify any symptom which could ordinarily be ascribed to the tumor or the meningitis.

A tumor in the frontal region rarely, if ever, gives definite localizing symptoms. In this case the apathy and indifference to her surroundings and also the early headache may be due to it. Its position near Broca's convolution suggests some connection with the speech defect, but it is more probable that the lesions in the pons have more to do with it.

The ptosis may be accounted for by the extension from the Gasserian ganglion, but it seems very probable that there may have been a nuclear lesion. The visual hallucinations may be accounted for by the meningitis and the dulling of consciousness following it and the tumor.

The lesions in the pyramidal tract explain the Babinski reflex, but there hardly seems to be enough difference in the two tract lesions to explain why it should exist on one side and not on the other. There was probably some focal lesion in the cervical cord which interfered with the reflex arc of the left arm and slightly with that of the right which could explain the arm reflexes.

The paralysis of the left side was due directly to the destruction of the Betz cells, and this destruction can be accounted for by toxic influences from the meninges or by pressure from the tumor, but one would be inclined to give more to the toxic hypothesis.

The case offers nothing new so far as localization is concerned, but it does call attention to the vast changes which may be caused by arteriosclerosis, and also to the meningeal consequences of a chronic otitis media. In a large number of the cases which have come to autopsy in this institution in the last six months pus has been found in the middle ear. There is no doubt that the middle-ear infection has in some cases influenced the clinical picture. The diagnosis of such cases is almost an impossibility as yet, but it is worth while to keep such things in view, especially as they influence so much the prognosis.

1908-09.

Southard, E. E., and Mitchell, H. W. Clinical and Anatomical Analysis of 23 Cases of Insanity arising in the Sixth and Seventh Decades, with Especial Relation to the Incidence of Arteriosclerosis and Senile Atrophy and to the Distribution of Cortical Pigments. Proceedings, American Medico-Psychological Association, 1908, 179–222. Also in American Journal of Insanity, Baltimore, 1908–09, LXV, 293–336.

Conclusions.

Arteriosclerosis and senility, separately or combined, have been very handy terms in psychiatrical diagnosis. However, we believe we have proved conclusively, by the present analysis, that neither old-age changes nor arterial disease have any necessary connection with the development of insanity in the later years of life, at least in the sixth and seventh decades. It seems probable that arteriosclerosis, senility and various forms of insanity are entities which frequently interpenetrate, but are logically and genetically quite separate. Even the degree to which old age and arterial disease serve as complicating factors in insanity has been much overestimated.

The constructive part of our paper looks in the direction of the distribution of intracellular pigments, a species of work harking back to the somewhat neglected field of Bevan Lewis (1890). The perivascular cell pigments, according to our comparisons, seem to afford some index of the degree of faulty metabolism of the cerebral tissue; these pigments are deposited in like amounts

throughout a given brain. The neuroglia cell pigments, in the light of the present material, vary rather with the age of the individual. The nerve-cell accumulations are subject to the greatest variations even in a single brain, certainly do not vary with the age of the individual, and vary according to some undetermined principle.

We have omitted literary references in the present paper, but wish to express our gratitude to Prof. A. M. Barrett for the use of some of his Danvers Hospital material. Our work may be regarded as in some sense a complement to Barrett's Study of Mental Diseases associated with Cerebral Arteriosclerosis (American Journal of Insanity, LXXII, 1, 1905). Our cases are from the same general source as Barrett's cases, but are in no instance identical therewith.

It would be of some value to fuse with the present analysis a similar analysis of the frankly organic cases of the same epoch, in order to pick out, if possible, the special constituents of the mental picture produced by the gross lesions. This task we have in hand.

Our results briefly are: —

- 1. Twenty-three cases of insanity, presumed to arise in the sixth and seventh decades, have been studied clinically and anatomically. Two of these were alcoholic in origin. Five were paranoic. Four were cases of delirium. Three were maniacal. Nine were cases of depression.
- 2. Two of the paranoic cases developed katatoniform symptoms, and might be placed in the dementia præcox group.

Seven cases are possibly classifiable in the manic-depressive group. Two of these had attacks of retardation. One case remained maniacal for thirteen years. One recovered from a single suicidal depression and died eight years later of intercurrent disease.

- 3. Neither general nor cerebral arteriosclerosis bears an essential causative relation to the insanities developed in the sixth and seventh decades by the 23 cases clinically and anatomically studied.
- 4. The insanities arising in these decades are not characteristically due to the premature onset of senile atrophy. Eight out of 11 female brains were atrophic: the average age at death was 69.8; the average duration 10.8 years. Five out of 12 male brains were atrophic: the average age at death was 65.6; the average duration 2.7 years.

Either the female cases are more liable to brain atrophy and to live longer with atrophied brains, or else the atrophy is merely a function of their greater age at death. The average age at death in all 11 females is 67.2; the average duration 8.8 years. The average age at death in all 12 males is 62.3; the average duration 2.8 years. The differences in age at onset — female average 58.4 (atrophics, 59.8), male average 59.5 (atrophics, 62.9) — are not great.

5. A comparative study of the distribution and extent in several cortical areas of certain pigmented materials demonstrable by iron-hematoxylin (among other methods) brings out extreme and interesting variations in the cases examined.

Perivascular cell pigmentation is almost uniform in different areas of the same case, bar focal destructive lesions, but varies in degree in different cases.

Neuroglia cell pigmentation, when of general distribution, probably varies more or less directly with age.

Nerve-cell pigmentation (iron-hematoxylin) is not a function of age. It is premature to relate the amounts and distributions of nerve-cell pigments with different mental diseases.

COTTON, H. A., and SOUTHARD, E. E. A Case of Central Neuritis with Autopsy. American Journal of Insanity, Baltimore, 1908–09, LXV, 633–652.

SUMMARY AND CONCLUSIONS.

The present case is a fresh example of Adolf Meyer's central neuritis, and shows, as did some of Meyer's cases, an involvement of the peripheral and sympathetic nervous system, together with the central nervous system, in a condition of severe and extensive lytic change. These lytic changes are exhibited in characteristic Marchi degenerations of the medullated fibers, and in the axonal reaction of Nissl in certain nerve-cell types.

These fiber and cell changes are, it is probable, only the evident fraction of a large series of changes of a lytic nature, most of which cannot be demonstrated by present histological methods. Thus the Marchi degenerations invariably surpass in amount the axonal reactions, doubtless because many of the fibers which show fat drops are connected with cells that are too small or too scantily supplied with Nissl bodies to exhibit the axonal reaction of Nissl. As shown by the Scharlach method, the small cells have

undergone a serious form of degeneration, and are filled with fatty pigment.

Another evidence of the universality of these changes is the characteristic reduction of consistence on the part of both the encephalon and the cord. Attention has been called to this alteration of consistence by Southard and Hodskins. In the case reported by them, the reduction was striking in all parts except an area of sclerosis in one hemisphere. Examination of the tissues by the Marchi and Nissl methods showed that the preserved nerve cells and fibers in the sclerotic area exhibited the same changes as the cells and fibers elsewhere. The disease. therefore, seemed due to some lytic agent differential for nerve elements, possibly an autolytic agent. The present case again illustrates the generalized reduction of consistence of central nerve tissues (general encephalomalacia and myelomalacia), together with some indication of the process in the peripheral elements, the result, perhaps, of a lysis or autolysis yet more general (neuromalacia).

The question may well arise whether the cells or the fibers are the first to be involved in the lysis. Despite the extent and severity of the Marchi degenerations in the medullated fibers, it is nevertheless probable that the lysis primarily affects the nervous elements rather than the myelin investments. point is borne out by the extensive changes, simulating the axonal reaction, in the nerve cells of Auerbach's plexus in the present case. Reasoning from this finding to the interpretation of central nervous findings, it seems possible to argue that the hypothetical lytic agent attacks elements largely proteid in character. The Cajal fibril preparations, so far as decisive, are consistent with this hypothesis. The nerve cells, stained with Scharlach Roth, show no accumulations of fat within the central or chromatolyzed area in the first stages of degeneration, but later, as degeneration proceeds, the whole cell is filled with fatty pigment.

When such cytolytic changes prove to be so extensive as in the present case, involving various groups of axis-cylinders and eventually various nerve cell bodies and nuclei, as well as myelin sheaths in many regions, it may well be that the change here particularized is only an expression of a still more general lysis or autolysis which will be best attacked along chemical lines.

1909.

- SOUTHARD, E. E., and RICHARDS, E. T. F. The Lesions of Bacillary Dysentery. Boston Medical and Surgical Journal, 1909, CLXI, 694-703.
- SOUTHARD, E. E. Conclusions from Work on the Danvers Dysentery Epidemic of 1908. Boston Medical and Surgical Journal, 1909, CLXI, 709-714.
- SOUTHARD, E. E., aided by McGaffin, C. G. Nervous System in Bacillary Dysentery. Boston Medical and Surgical Journal, 1909, CLXI, 703-705.

Conclusions.

- 1. The brains of reduced consistence in our series can scarcely be regarded as showing effects of dysentery toxin, since in many cases of this group paraneuraxial infection with other organisms (terminal or secondary invaders of the cerebrospinal fluid) was established.
- 2. Organic disease of the central nervous system has no special effect in favoring fatal issue.
- 3. Severe fatty degeneration, demonstrated by the Marchi method, and indicating lesions probably of several days' standing, was characteristic of the non-ulcerative cases, and may point to a differential feature in the organism or toxin of the first phase of the epidemic. (See Articles IV, VI and X.) Or, on the contrary, this finding may point to the importance of secondary infection in dysentery.
- 4. Hemorrhagic lesions in the anterior horns of the spinal cords were not present.
- 5. Two cases of thrombosis of superficial cerebral arteries have been noted in cases before the epidemic.
- Henderson, L. J., and Southard, E. E. The Cultural Value of Certain Medical Studies and the Elective System in Medical Education. Boston Medical and Surgical Journal, 1909, CLXI, 981-983.

REMARKS.

All that we contend for in the matter which Professor Dwight has discussed is, first, that there are broadly scientific courses in the medical school whose nature is fixed by the consensus of opinion of the teachers of such subjects throughout the world; and secondly, that it is at least an open question, not to be settled by a judgment ex cathedra or on medical grounds, whether or not they are well suited to count for the bachelor's degree.

- SOUTHARD, E. E., and HENDERSON, L. J. Education in Medicine. (Letter.) Boston Medical and Surgical Journal, 1909, CLXI, 948-949.
- GAY, F. P., SOUTHARD, E. E., and FITZGERALD, J. G. Neuro-physiological Effects of Anaphylactic Intoxication. Journal of Medical Research, Boston, 1909, XXI, 21-40. (New series, Vol. XVI.)

SUMMARY AND REMARKS.

The work of Gay and Southard upon the localization of cell and tissue anaphylaxis (serum type) in the guinea pig has been continued. The work of 1908 had brought out sharply the strict comparability of intravascular and orbital injections in their capacity to produce violent respiratory symptoms or death. As was then stated, "The occurrence and rapidity of death in the critical phase, as well as the severity of respiratory symptoms throughout the toxic phase, appear to vary with the nearness of the toxic injections to the respiratory central apparatus."

But evidence was further adduced to show that the sensitization of the respiratory centers was but relative, and that those who claim that the toxic effects are due to a specifically respiratory toxin are inexact.

The theoretical significance of injections alongside the nervous system (paraneuraxial injections) was shown to consist in the capacity of such injections to spread directly through the cerebrospinal fluid to the respiratory centers. Such direct paraneuraxial drenching of the sensitized nervous system was shown both theoretically and experimentally to be approximately equivalent to intoxication by the intravascular route.

The evidence from paraneuraxial injections has now been strengthened, and so supported by evidence from several kinds of intraneuraxial injections as to warrant confirmation of our tentative statement of 1908, "that differential irritative and paralytic reactions can be secured by small localized injections of horse serum adjacent to various parts of the sensitized central nervous system."

The most lethal form of paraneuraxial injection is the orbital. The orbital method of injection is the method of election for determining toxicity, in Besredka's sense, since the complicating features of intravascular injection and of trephining are avoided. The orbital method permits immediate drenching of the bulb through the cerebrospinal fluid.

Many varieties of paraneuraxial injection have been practiced. To secure non-respiratory phenomena and avoid lethal outcome, it is only necessary to inject the serum into the muscular and interstitial tissues outside the nervous system, thus permitting a slower absorption and a differentiation of results analogous to that secured by comparative intraperitoneal and subcutaneous injections.

Both irritative and paretic non-respiratory symptoms can be produced by paraneuraxial injections of various dosage appropriately localized.

It is not probable that these paraneuraxial injections act by intoxicating the nerves suspended in the cerebrospinal fluid; at any rate, no comparable degree of intoxication has been secured by paraneural applications of serum outside the enclosing sheath of the central nervous system (trigeminus, sciatic nerve). Nor has death ever followed applications to the vagus in its extradural course despite the production of severe respiratory symptoms thereby.

Intraneuraxial injections (e.g., intracerebellar, intramyelic, intracerebral) in sensitized animals effect a variety of symptoms, sometimes irritative, sometimes paretic. It is easy to distinguish respiratory and non-respiratory phenomena.

Intramyelic injections in the cervical region produce not merely the expected respiratory symptoms, but also brachial paraplegia.

The effects of intracerebellar injections must be interpreted with caution, on account of symptoms producible by purely mechanical means. Opisthotonus and nystagmus appear to be characteristic of anaphylactic intoxication. But with respect to nystagmus, the proximity of the restiform body and of the corpora quadrigemina must be considered.

Intracerebral injections produce a variety of symptoms, such that the locus of injection becomes important to consider. We are able to distinguish a motor from a sensorimotor (olfactory) type of reaction. These observations open a field of considerable neurological interest, since heretofore electrical stimulation in normal animals has been the best means of attack on localizing

problems. Obviously extirpation experiments before and after sensitization and subsequent anaphylactic intoxication will unearth many novel facts.

We are not disposed to emphasize unduly the dualistic or anaphylactin hypothesis of Gay and Southard as applied to the phenomena of anaphylaxis. We would only once more call to the attention of the supporters of the antibody hypothesis how much more difficult that hypothesis becomes in case the alleged antibodies are intracellular and lodge in varying degree in different loci of the nervous system as well as elsewhere in the body.

SOUTHARD, E. E. A Study of Errors in the Diagnosis of General Paresis. (Abstract.) Journal of Nervous and Mental Disease, Lancaster, Pa., and New York, 1909, XXXVI, 545– 549. Also in Journal of Nervous and Mental Disease, Lancaster, Pa., 1910, XXXVII, 1–16.

Conclusions.

- 1. An effort has been made to establish the accuracy of diagnosis in general paresis. The method has been to analyze clinically the data of cases in which several experienced workers had agreed upon the diagnosis, and to compare their findings with the anatomical and histological data of the autopsies.
- 2. Thirty-five out of 41 cases unanimously diagnosed general paresis ante mortem proved to be cases of general paresis (85 per cent accuracy).
- 3. Six cases of erroneous diagnosis have been especially studied. None of these showed plasma cells in the nerve tissues (Nissl's methylene blue and L. Ehrlich's pyronin methods), but all showed a variety of lesions which warrant placing them in an "organic" group.
- 4. The lesions probably responsible for the errors in diagnosis were: (a) Meningomyelitis and subcortical encephalitis (luetic?), Case V; (b) tabes dorsalis and non-paretic cerebral disease, Cases I, IV; (c) arteriosclerotic brain disease with severe cerebellar involvement (dentate nuclei), Cases II, VI; (d) cerebral sclerosis (type, perivascular gliosis), Case III.
- 5. Although at first sight a probable error of 15 per cent in the diagnosis of general paresis might suggest difficulties in possible medicolegal cases, it is obvious that, were the diagnosis confined to "incurable insanity" or even to "organic brain disease," the error would disappear. However, 2 cases proved to be gen-

- eral paresis (on the plasma-cell criterion) in a series of 186 cases similarly examined in which the diagnosis of general paresis was not considered.
- 6. Improvements in our diagnostic ability could perhaps be introduced by lumbar puncture and cytological examination in a greater proportion of cases. But it is doubtful whether 3 of the 6 errors here studied would have been resolved by cyto-diagnosis (meningomyelitis, tabes dorsalis). One other case (VI, arteriosclerotic brain disease) actually did show plasma cells in the lumbar puncture fluid, the source of which was not made out at autopsy.
- HENDERSON, L. J., Ph.D., and SOUTHARD, E. E. Education in Medicine. The Relations of the Medical School and the College. The Harvard Bulletin, Nov. 3, 1909, XII, 1-3 and 6. See also Science, 1909, XXX, 679-680.
- SOUTHARD, E. E., and HENDERSON, L. J. Education in Medicine. The Elevation of the Medical Directorate. The Harvard Bulletin, Dec. 8, 1909, XII, 2.
- Southard, E. E. Communication: Cultural Value of the Medical Sciences. The Harvard Bulletin, Dec. 15, 1909, XII.

1910.

Putnam, J. J., and Southard, E. E., aided by Ruggles, A. H. Observations on a Case of Protracted Cerebrospinal Syphilis with Striking Intermittency of Symptoms: Attempt at Correlation with Ascending Meningomyelitis, Cranial Neuritis, Subcortical Encephalitic, and Focal Encephalomalacia found at Autopsy. Journal of Nervous and Mental Disease, 1910, XXXVII, 145–163.

Conclusions.

The very varied problems and considerations of this case may be set forth as follows: —

1. A protracted case of cerebrospinal syphilis shows at the end of sixteen years after infection and eleven years after initial nerve symptoms a multiplicity of chronic lesions, but shows few acute lesions save (a) lymphocytic exudation in the upper spinal cord segments (preferring the posterior root regions), and (b)

certain interesting leukencephalitic foci in the brain. Possibly both (a) and (b) are related to intercurrent infection from extensive decubitus; this is more likely in the case of (b). Search for spirochetæ so far negative.

- 2. On the basis of gross and histological findings it is possible to correlate many of the various clinical features: (a) transverse myelitis, (b) intermittent cranial nerve and other symptoms, with structural disorder. But there were hysterical tendencies throughout which rendered exact correlations difficult *intra vitam*.
- 3. The intermittency of symptoms just mentioned 2 (b) was most striking, and an enumeration of histological possibilities is given which might account for this intermittency (acute and reparative changes in the pia mater; cellular and fibrillar gliosis, whether nuclear, periradicular, or, in some cases, intra-radicular; and the corset-like contraction of whole regions subject to sclerosis, with consequent herniation of small bits of nerve tissue).
- 4. The intermittency and varied structural origin of the symptoms, as well as the maintenance to the last of acute changes mentioned under 1, are reasons for optimism in pushing antisyphilitic treatment.
- 5. Incidentally, the post-mortem data show how lumbar puncture might fail to reveal lymphocytes in cerebrospinal syphilis, provided that there is an occlusion of the intermeningeal space by adhesions above the point of puncture.
- 6. The case presented a kind of reversal of the biological tendency that the structures later evolved shall be destroyed first, since the course of lesions in this case was largely ascending throughout, and the cerebral cortex was left at the last a species of shell from which the lower functioning mechanisms had been successively scooped out by disease.
- SOUTHARD, E.E. Anatomical Findings in Senile Dementia: A Diagnostic Study bearing especially on the Group of Cerebral Atrophies. American Journal of Insanity, Baltimore, 1909–10, LXVI, 673–708. Also in Proceedings, American Medico-Psychological Association, 1909, XVI, 511–548.

SUMMARY AND CONCLUSIONS.

1. Forty-two cases unanimously diagnosed "senile dementia" at the Danvers Hospital clinics have been reviewed clinically and anatomically, with a surprisingly low general percentage of ac-

curacy (66 per cent) where either cerebral atrophy or cortical arteriosclerosis or both were regarded as confirmatory, and with still lower percentages: (48 per cent) where cortical arteriosclerosis was considered essential, and (38 per cent) where cerebral atrophy was considered essential, for a correct diagnosis.

- 2. The 14 cases which showed neither cerebral atrophy nor cortical arteriosclerosis (with obvious damage to the cortical tissues) are cases which probably should not have been termed senile dementia, and perhaps more properly belong in a group of acute psychoses or other mental diseases occurring in old age but not dependent on recognizable senile changes.
- 3. Of the residuum, it is clear that cases in which cerebral atrophy and cortical arteriosclerosis are combined are not suitable for exact study, and attention has been concentrated upon eight cases of relatively pure brain atrophy, regarded as representing more nearly genuine senile dementia than the arteriosclerotic cases, which should be classed under the head of organic dementia.
- 4. True senile or senile atrophic dementia includes (1) cases in which the loss in brain weight proceeds pari passu with a general loss of weight in the other viscera, and (2) cases in which the loss in weight of the nerve tissues is differential.
 - 5. The mental diseases of old age, therefore, include —
- (a) Mental diseases occurring in, but not characteristic of, old age.
 - (b) Organic dementias due to cortical arteriosclerosis.
- (c) Senile atrophic dementias, attended with (1) general visceral atrophy and (2) differential atrophy of the nerve tissues.
- 6. Obvious suggestions for research in the two groups of senile atrophic dementias as above stated are that the phenomena of general visceral atrophy may depend upon general decadent agencies (dehydration?), and that the more differential atrophy indicates special metabolic flaws or toxic agencies.
- 7. Since such a grouping has not been hitherto rigorously borne in mind, it is not possible to state the clinical features of these cases in detail.
- 8. Taking the group senile atrophic dementia as a whole, we find all the eight cases female, without special indications of inheritance, with very various antecedent factors (social factors not prominent), all markedly defective in vision (though for a considerable variety of reasons), often defective in hearing, all subject to various degrees of arteriosclerosis (in some instances not clinically made out), all showing the characteristic external signs

of senility, and all showing either chronic diffuse nephritis (interstitial type predominant) or renal arteriosclerosis.

- 9. Neurologically, the eight cases showed characteristically tremors, absence of certain superficial reflexes, variations in some deep reflexes (tendency to loss of leg reflexes), defective organic reflexes, alterations of gait, and occasional slight speech disorder.
- 10. Psychiatrically, communication with the patients is difficult and impressibility or general perceptual capacity is deficient. The amnesia for recent events is characteristic and constant. The patients are perhaps unoriented rather than disoriented. Amnesia for remote events is also frequently present. Delusions are not prominent. Visual or auditory hallucinations (or illusions) characterized some cases. Motor excitement and nightly restlessness and noise are characteristic, though not quite constant, and are not in all cases certainly due to hallucinations. Garrulity was surprisingly uncommon in this group.
- 11. Anatomically the pia mater was in general remarkably free from chronic changes, and, as the condition of the vessels was the basis of selection of the cases, the vessels naturally showed nothing grossly beyond involvement of the larger or pipe arteries (basal cerebral arteriosclerosis). The cerebral wasting was not in all cases quite uniform. One case even showed a slight granular ependymitis. The consistence of the brain tissue was in general increased.
- 12. A high percentage of obsolete tuberculosis characterized the autopsies.
- 13. Aortic sclerosis is probably constant in these cases. Sclerosis of other vessels is frequent but variable. The constancy of renal changes is interesting.
- 14. The cause of death is pulmonary in many cases, and is perhaps in some way bacterial in all.
- 15. No intensive microscopic examination has been undertaken, as the object has been rather to define the group of senile atrophic dementias. The satellite cell findings are consistent with Metchnikoff's hypothesis concerning phagocytic processes in old age. It is believed, however, that cell and fiber changes are very probably primary and "neuronophagia" secondary, or at any rate that these processes run pari passu.
- 16. A few cases showed satellite cells preferring the apical cell processes rather than the basal regions of the pyramidal cells.
- 17. It is alleged that no convincing evidence has been brought of a causal relation between *local* vascular changes and diffuse senile nerve-cell atrophy.

- SOUTHARD, E. E. Acute Encephalitis and Brain Abscess. In Osler's "Modern Medicine," 1910, VII, 624-653. Also in second edition, 1915, V, 359-386.
- Southard, E. E., and Fitzgerald, J. G. Discussion of Psychic and Somatic Factors in a Case of Acute Delirium dying of Septicemia: Note upon Experimental Guinea Pig Infection with Staphylococcus Albus. Boston Medical and Surgical Journal, 1910, CLXII, 452-458.

DISCUSSION.

It is possible, by shifting the emphasis in a clinical history, to convey two quite separate notions as to the genesis of a given case of mental disease. Yet an answer to the question whether somatic or psychic (hereditary, individual, social) factors are the more important in many cases of mental disease would be decisive in the inclination of research upon these factors. It is our opinion that research should be inclined upon the side of the bacteria and the toxins in appropriate cases.

Although no single logical step in the process is absolutely safe, we feel that a reasonable account of our case might be as follows:—

- 1. A cluster of nervous symptoms, compounded from the effects of uterine growths and unhappy married life.
- 2. Latent blood infection (staphylococcus albus bacteriemia) possibly related, through some unidentifiable atrium of infection, with acne.
- 3. Rapid and massive enlargement of uterine growths (determining in some obscure way the sexual trend of symptoms?) and pressure upon the iliac veins.
- 4. Thrombosis of iliac veins and vena cava (date not clear, possibly at the onset of the mental symptoms, possibly fifteen days later) and its sequelæ.
- 5. Acute delirium, difficult logically either to connect with or to disconnect from the thrombosis and bacteriemia discovered at autopsy.
 - 6. Death from septicemia and pulmonary thrombosis.

The case detailed above raises the question whether the incidence of bacteria of low toxicity can determine insanity of the type of acute delirium. Many textbooks seem to admit something of the sort in their groups of *infectious deliria*. It must be conceded, however, that the precise relationship of infection to delirium in its psychiatric sense is still far from clear.

As to the toxic value of staphylococcus albus, writers are not wholly clear. Genuine cases of albus septicemia are not unknown. The remarkable work of Winslow on the Coccaceæ has served to unify rather than separate the staphylococci of various Kraus and Pribram (1906) have shown that many varieties of staphylococci produce a true toxin which will pass into the culture filtrate and produce an antitoxin; the toxin in question appears to poison the heart especially. Panichi (1906) was able to cultivate the albus repeatedly over weeks and months from the blood of two subjects who otherwise gave no noteworthy signs of infection. Similar results with other organisms. especially in convalescence, are serving to overthrow our older notions of the essential injuriousness of bacteriemia. teriemia of unknown atrium may readily permit infection and thrombosis of tissues under such conditions as those of the iliac veins in the case above described. Moreover, it does not overstep the bounds of probability to state that a variety of symptoms, among them mental, may accrue from such low-grade infections.

The hypothesis that drug-like products of bacteria, or bacteria themselves drug-like in action, may produce mental symptoms is certainly far from unlikely, though it is also true that idiosyncrasy or special sensitization may be essential to permit the development of such symptoms.

It is obvious, however, that psychiatric clinics are not working this field intensively, and for such work we wish to put in a plea. Routine blood cultures and carefully chosen immunity tests (especially those just recently developed for other purposes as a result of the work of Bordet and others) in such cases would go far to clear up these obscure relations. Perhaps only by such intensive work can the mechanism of certain types of insanity be learned.

GAY, F. P., and SOUTHARD, E. E. The Significance of Bacteria cultivated from the Human Cadaver: A Study of 100 Cases of Mental Disease, with Blood and Cerebrospinal Fluid. Cultures and Clinical and Histological Correlations. Centralblat f. Bakteriologie (etc.), 1. Abt., Jena, 1910, LV, Orig., 117–133. (From the Laboratory of the Danvers State Hospital.)

Conclusions.

1. The results of bacterial cultivations from the heart's blood, and the cerebrospinal fluid post mortem in 100 cases of mental disease, have been correlated with the histopathological findings

(Marchi impregnations of the spinal cord at three levels) and the clinical histories, having special reference to a history of terminal disease over or under four days' duration (regarded as a period in which typical Marchi alterations might ensue).

- 2. The bacteria were cultivated upon agar plates inoculated with 1 to 1.5 cubic centimeters heart's blood and others with the same amount of cerebrospinal fluid. The cerebrospinal fluid was removed from the third ventricle through the infundibulum, severed at its origin.
- 3. Forty-one per cent of our heart's blood cultures remained sterile (cf. Gradwohl, 22 per cent; Otten, 42 per cent; Simmonds, 48 per cent).
- 4. Twenty-eight per cent of the cerebrospinal fluid cultures remained sterile.
- 5. Under the conditions of our laboratory the statistics show (Table I) that there is no significant difference in the percentage of positive cultures from either source at varying hours post mortem, and that the danger of contamination must be limited to a brief interval after death.
- 6. Our findings point definitely, if indirectly, to the intravital significance of the bacteria found, despite the fact that in no particular instance is the chain of evidence complete.
- 7. Since the same bacteriolytic substances are found in blood serum both before and for some time after death, there is no reason for supposing that bacteria can grow better post mortem.
- 8. We now show that bacteriolytic substances are absent in the cerebrospinal fluid, so that there appears to exist therein no extracellular mechanism for the disposal of bacteria.
- 9. The fact just stated (7 and 8) may account for the higher percentage of organisms in the cerebrospinal fluid.
- 10. Among the facts concerning the incidence of bacterial forms (Table II) are these: cocci were found in the blood in 26 cases, in the cerebrospinal fluid in 34 cases; streptococci, blood, 8 times, cerebrospinal fluid, twice; pneumococci, blood, 3 times; B. coli aërogenes group, blood, 11 times, cerebrospinal fluid, 25 times; B. proteus group, cerebrospinal fluid, 7 times.
- 11. The absence of diphtheroid organisms from our series is noteworthy, since in previous years cultivations at the Danvers Hospital had yielded such organisms in several cases.
- 12. Cultivations from thirteen general paretics are listed (Table III); in the positive cases cocci prevail.
 - 13. Nine bacteriologically negative cases are listed (Table

- IV); reasons are adduced for certain histopathological changes, possibly independent of bacteria, in these cases.
- 14. Ten cases which failed to show specified histopathological changes are listed (Table V), from which it appears that coli is not found associated with such cases unless the terminal disease happens to have been brief. On the other hand, cocci are a frequent finding in this group.
- 15. Thirty-one cases which had terminal symptoms less than four days in duration are listed (Table VI); 29 per cent of these failed to show spinal cord degenerations by the Marchi method (as against 10 per cent in the total series).
- 16. Of 10 cases selected as showing most numerous spinal fatty degenerations (diffusely scattered blackenings in white and gray matter), 9 showed coli communis either in heart's blood or in cerebrospinal fluid or in both, and 8 in large numbers.
- 17. Of 18 cases yielding 40 or more colonies of coli communis from one or each source, 8 showed extreme degrees of Marchi degeneration, 5 relatively severe changes (intraspinal and intraradicular), and the 5 remaining cases showed considerable intraspinal change.
- 18. Of 13 cases showing generalized softening of brain tissue (general encephalomalacia), 10 yielded coli communis.
- 19. A definite relation must be assumed to exist between coli communis or its toxines and nerve-fiber degeneration.
- SOUTHARD, E. E. The Laboratory Work of the Danvers State Hospital, Hathorne, Mass., with Especial Relation to the Policy formulated by Dr. Charles Whitney Page, Superintendent, 1888–98, 1903–10. Boston Medical and Surgical Journal, 1910, CLXIII, 150–155.

REMARKS.

What has been brought out in extenso refers to the more purely scientific side of the Danvers work, as largely favored, advocated and mechanized by Dr. Page, to whom we wish to present the product of our recent work in the articles of this series. The chief considerations are as follows:—

- 1. The insane hospital gets no vital support from a medical profession ill-educated in mental disease.
- 2. The situation is apt, in America at large, to be dominated by the *per capita cost* rather than by the humanitarian considerations which underlie the whole system of treatment of the insane.

- 3. The superintendency of a State hospital for the insane has become a position requiring generalship; is strategic rather than tactical.
- 4. Since the superintendent has oversight of the science as well as the art of psychiatry, as exemplified in his hospital, it becomes his duty continually to improve the laboratory as well as the ward facilities, and this *in the interest of the patient*.
- 5. Dr. Page's Danvers work has contributed to the economics underlying the proper co-ordination of the two aspects the ward and laboratory aspects of the large problem of diagnosis and treatment of insane patients in State hospitals.
- 6. Special attention may be drawn (a) to the appointment of specially (though very variously) trained men to the pathologist-ships; (b) to the encouragement by maintenance of special laboratory internes; (c) to the daily clinic system with its republican feature of rotating leaders; and (d) to the complete index of symptoms now on file for all Danvers patients.
- 7. The maintenance of clinico-pathological laboratories in State hospitals for the insane is argued as a method for general adoption on account of improvements in diagnosis, and hence in treatment, which follow their establishment.
- Southard, E. E. The Margin of Error in the Diagnosis of Mental Disease: Based on a Clinical and Anatomical Review of 250 Cases examined at the Danvers State Hospital, Massachusetts, 1904-08. Boston Medical and Surgical Journal, 1910, CLXIII, 155-159.

SUMMARY.

- 1. A series of 250 cases of mental disease, with *intra-vitam* diagnoses by several physicians, recorded at the Danvers State Hospital daily clinics, 1904–08, has been subjected to anatomical review for the sake of learning where lie the greatest difficulties in diagnosis.
- 2. Ten cases (4 per cent) remain both clinically and anatomically obscure.
- 3. Seven cases (2.8 per cent) had diagnostic doubts settled after the clinic either *intra-vitam* or *post mortem* (one case each of general paresis, cortical arteriosclerosis, cerebral sclerosis with Graves' disease, streptococcus septicemia, epilepsy, streptococcus meningitis, cerebellar abscess).
 - 4. Sixty-six cases (26 per cent) were doubtful clinically, but

the correct diagnosis was obtained by one or more diagnosticians in 49 of the 66 (74 per cent of the doubtful group).

- 5. One hundred and eighty-four cases (74 per cent) were clinically certain, and the clinical diagnoses were confirmed (or not altered) by autopsy in 163 of the 184 (89 per cent of the unanimous group).
- 6. The correct diagnosis was obtained by one or more diagnosticians in 49 + 163 = 212 cases in 250 (85 per cent).
- 7. The "correctness" of these diagnoses is subject to some reservation, (1) since within the "organic and senile dementia group" differentiation proved difficult, and (2) since anatomical "consistency" often signifies absence of characteristic lesions. The acute psychoses have been reviewed, however, bearing in mind modern views. Several alcoholic cases failed to exhibit striking brain lesions.
- 8. The majority of the real diagnostic difficulties uncovered by this analysis would appear to require more intensive work in the field of clinical pathology. For such work in psychopathic hospitals this paper is an appeal.
- Southard, E. E., and Canavan, Myrtelle M. Bacterial Invasion of the Blood and Cerebrospinal Fluid by Way of Mesenteric Lymph Nodes: A Study of 50 Cases of Mental Disease. Boston Medical and Surgical Journal, 1910, CLXIII, 202-209.

SUMMARY.

- 1. Following the same technic chosen by Gay and Southard for their study of the post-mortem bacteriology of the heart's blood and cerebrospinal fluid in 100 cases of mental disease, the writers have examined 50 further cases from the same source (Danvers State Hospital, Massachusetts), with the addition of cultivations from mesenteric lymph nodes.
- 2. The material was unselected, save (1) that cases without readily palpable nodes were not examined, and (2) that 30 of the 50 cases gave macroscopic signs of intestinal disease of greater or less severity (15 from an epidemic of bacillary dysentery).
- 3. As in the former work, there were no detectable differences in the proportion of bacteria grown at different intervals post mortem. (Table I.)
- 4. Positive cultivations (excluding a few frank contaminations) were obtained in (a) cerebrospinal fluid, 85 per cent; (b) blood, 80 per cent, and (c) node, 78 per cent.

- 5. Growths from all three regions were obtained in 55 per cent.
- 6. Growths from two out of the three regions were most frequently obtained in cerebrospinal fluid and lymph node (17 per cent), a fact which may be interpreted as due to an effective bacteriolysis in the blood (compare previous article).
- 7. Table II gives the incidence of various organisms found: Cocci in the blood, 20 cases; in the cerebrospinal fluid, 22 cases; and in the lymph node, 16 cases (staphylococcus aureus in these sources, 5, 6 and 3 cases, respectively; streptococci, 2, 1 and 0 cases). Bacilli in 1, 8 and 10 cases in the respective sources.
- 8. The colibacilloses are especially interesting in the light of the relation between colibacillosis and "soft brains" suggested by the results of Gay and Southard. Our one case of colibacillemia failed to show a "soft brain." Two of three cases of pure cerebrospinal colibacillosis yielded "soft brains," and the third (doubtful bacteriologically) was negative. The three combined lymphnodal and cerebrospinal invasions were unsuitable, being all three instances of extreme sclerosis. Two of the 3 pure lymphnodal colibacilloses showed "soft brains" (one only in non-sclerotic parts) and the third was negative. Thus 4 out of 7 cases suitable for such display showed palpably soft brains in association with colibacillosis.
- 9. Analyzing in the other direction, there were 7 "soft brains" in the series, 3 of which showed colibacillosis; 2, infection with special pathogenic bacilli (under special study); 1, contamination of node; and 1, generalized invasion with certain unidentified cocci.
- 10. Appropriate atria for the invasions and infections are demonstrable in the majority of instances.
- 11. Our findings seem consistent with the hypothesis that in the terminal exhaustions of the insane bacterial invasions are almost the rule. Perhaps otherwise normal and quite healthy subjects may, more often than hitherto suspected, show bacteriemia or even cerebrospinal fluid invasions.
- 12. The intestinal wall is a leading atrium for such invasions,—an atrium perhaps the more penetrable by reason of atrophic processes frequently displayed. The livers and especially the spleens are much underweight in the majority of our cases.
- 13. Mesenteric and bronchial lymph nodes lead the other nodes in proportion of diseases displayed in the total Danvers collection. Often only one or two of the lymph nodes in the group exhibited gross lesions.

SOUTHARD, E. E. A Study of the Dementia Præcox Group in the Light of Certain Cases showing Anomalies or Scleroses in Particular Brain Regions. American Journal of Insanity, Baltimore, 1910–11, LXVII, 119–176. Also in Boston Medical and Surgical Journal, 1910, CLXIII, 159–182.

Conclusions.

- 1. Existent evidence for the organic nature of dementia præcox is not wholly convincing, since (a) the cytological changes described are found also in cases of toxic deliria and in cases complicated by severe visceral disease, and (b) the stratigraphic changes described are found also in certain senile cases without characteristic symptoms of dementia præcox.
- 2. Resort must, therefore, be had to the topographic idea, for the adequate exploitation of which total brain sections, with cytological exploration of all areas, are ideally necessary.
- 3. Random blocks of brain tissue with demonstration of satellitosis, infrastellate gliosis, or disintegration products of cell disorder will throw little light on the mechanism of dementia præcox.
- 4. The data of the functionalists (dissociation, sejunction, intrapsychic ataxia, and the like) are of the utmost importance as indicating the essential focality of the pathogenic process and the focal variations in its severity.
- 5. The curability of certain cases, the remissive character of some cases, the speedy disappearance of particular symptoms, the persistent complexity of reaction in some instances, the absence of characteristic severe projection-system symptoms, all indicate that the process is histopathologically mild, and that the focal changes found will be but slightly destructive or even irritative (in the sense of slight injuries readily repaired or compensated for).
- 6. Grossly destructive lesions of a transcortical character in Wernicke's sense might conceivably effect, e.g., a permanent katatonic complex, and doubtless will be found to do so occasionally; but the protean and progressive character of dementia præcox will exclude such transcortical injuries from playing a large part in the pathogenesis.
- 7. The focal lesions to be sought for will doubtless escape macroscopic notice in many instances, since the volume of apparatus engaged in effecting very prominent symptoms is often slight and spread very thin in numerous areas.

- 8. Studies of the "soft brain" and of gliosis in epilepsy have proved, however, that even comparatively slight degrees of cortical gliosis can often be palpated at autopsy.
- 9. Palpable glioses of a focal or variable character, combined in numerous instances with visible atrophy and microgyria, have been found in over half the series under examination, in cases regarded as clinically above reproach and *not* subject to coarse wasting processes, focal encephalomalacia, cortical arteriosclerosis, or diffuse chronic pial changes.
- 10. The frequent co-existence of several foci of sclerosis or atrophy in the same brain and the microscopic observation of milder degrees of nerve-cell disorder and gliosis in regions without gross lesions tend to the conception that the agent is more general and diffuse in its action than would seem at first sight, so that future research may well demonstrate that certain instances of coarse brain wasting, and even of diffuse chronic leptomeningitis, belong in the group (microscopic corroboration necessary for assigning values to focal variations).
- 11. The microscopic examination of the residue of cases in which gross lesions or anomalies were not described shows the same tendency to gliosis and satellitosis in numerous instances, and the same tendency to focal variations from gyrus to gyrus exhibited by the gross lesion group. These findings suggest that the minor gross lesions and anomalies of several cases actually escaped notice (the protocols, though drawn up with a certain system, are by various hands) at autopsy, so that the probable actual proportion of gross lesions is 68 per cent. If microscopic evidence is resorted to, the "organic" proportion in our series rises to 86 per cent.
- 12. Several groups of cases were classified from the distribution of macroscopic lesions, although the focal purity of these cases can often be brought in question from the results of microscopic examination (infrastellate gliosis and satellitosis also in macroscopically "normal" areas).
- (a) Pre-Rolandic group, including a superior frontal-prefrontal sub-group of paranoidal trend (cf., e.g., Case 1062).
- (b) Post-Rolandic group, including (a) postcentral-superior-parietal (sensory-perceptual) sub-group in which katatonic features are the common factors (cf., e.g., Case 1298); (b) occipital sub-group (cf. Case 1149).
 - (c) Infra-sylvian group (too small for clinical correlations).
 - (d) Cerebellar group (katatonic features).

- 13. If these data find general confirmation, they will doubtless go far to unify discussion, since mild, variable and progressive intracortical lesions, proceeding at different rates in different parts of the apparatus, and having the peculiar distributions indicated above, would explain adequately some of the contentions of the dissociationists, while remaining not wholly inconsistent with Kraepelinian ideas.
- 14. The frontal-paranoid correlation is in line with modern physiological ideas, but it must be granted that the occipital and temporal regions, as elaborating important long-distance impulses, may well play a part also in paranoid states.
- 15. The cerebellar-katatonic correlation is doubtless in line with some contentions of the Wernicke school, and obvious comments might be made in connection with the proprioceptive functions of the cerebellum (Sherrington).
- 16. The postcentral-superior-parietal relations to katatonic symptoms are perhaps theoretically the most novel suggestion from the work, but here again the results are not inconsistent with modern physiology.
- 17. The topographic study of dementia præcox brains, both gross and microscopic, is commended as likely to shed new light on the pathogenesis of certain symptoms, notably paranoidal and katatonic symptoms.

1912.

Lucas, W. P., and Southard, E. E. Contributions to the Neurology of the Child. I. Convulsive Tendencies during and after Encephalitis in Children. (Reprinted also as Encephalitis and Epilepsy.) Boston Medical and Surgical Journal, 1912, CLXVI, 323-328.

Conclusions.

- 1. The records of the Children's Hospital from 1905 to date have been searched for possible instances of encephalitis. Cases of "encephalitis," "toxic encephalitis," "meningitis(?)," and "(?), encephalitis(?)" have been considered.
- 2. Twelve cases have been chosen which may with some reservations be regarded as cases of encephalitis. These show onset always sudden. Paralysis or paresis in all cases (oculomotor paralysis in 7). Deep reflexes altered in 10. Mental symptoms in 10. Rigidity of neck in 9. General convulsions, 7 (absent in 4). Nausea or vomiting, 5 (not noted in 7).

- 3. The results fall into three groups: (a) death during acute attack, 2 cases (X and XI); (b) recovery from acute attack, with subsequent epilepsy and mental deficiency, and death after twenty-one months, 1 case (II); (c) recovery from acute attack, with residual symptoms, 5 cases (I, III, V, IX, XII); 2 normal, except for strabismus and possible slight mental change (IV, VI); 2 epileptic and mentally defective (VII and VIII).
- 4. With respect to epilepsy, the total incidence of convulsions during the acute attack was 7 in 12. Of 9 cases still living 5 showed convulsions during the acute attacks, and 2 of the 5 (VII and VIII in chart) are epileptic.
- 5. In both epileptic cases there was a brief interval between recovery from the acute attack and the onset of epilepsy.
- 6. The detailed histories of a case developing epilepsy and of a fatal case with autopsy are presented.
- Southard, E. E. Psychopathology and Neuropathology: The Problems of Teaching and Research contrasted. Journal of American Medical Association, Chicago, 1912, LVIII, 914–916. Also in American Journal of Psychology, 1912, XXIII, 230–235.
- Southard, E. E. Note on the Geographical Distribution of Insanity in Massachusetts, 1901-10. Boston Medical and Surgical Journal, 1912, CLXVI, 479-483.

SUMMARY AND CONCLUSIONS.

The eugenic area or areas of a region are characterized by the operation of hereditary factors in either (a) the improvement of the contained human stocks, or (b) the maintenance of these stocks in statu quo.

The aristogenic program is that extreme eugenic program which seeks to produce more and greater great men for the world by more effective mating.

Against an ideal aristogenic program are operating certain deteriorating factors of hereditary nature (cacogenic factors).

The data immediately available in Massachusetts may be used in the study of eugenic areas in the second or negative sense (see (b) above) with respect to insanity.

The morbidity rate of the Massachusetts insane commitments is not the same as the accumulation rate, as an effect of many combined causes (Owen Copp's data).

One possibly eugenic area exists in Massachusetts in three island townships; another, in nine more scattered western townships (seven in the Berkshire Hills region).

The twelve possibly cacogenic towns have produced 236 new cases of insanity and allied conditions, being 15 per 1,000 in the population of these towns in 1910 (total Massachusetts rate, 7 per 1,000); highest single town rate considered, 19 per 1,000; Suffolk County (Boston, etc.) rate, 9 per 1,000; highest single city rate, 10 per 1,000.

These possibly cacogenic townships lie chiefly in the midland county of Worcester, and in no case west of the Connecticut River or on the seacoast.

The possibly eugenic and possibly cacogenic towns as considered from the commitment standpoint remain so to a degree when considered from the standpoint of the census of the same four classes enumerated in the townships May 1, 1905, viz., 2.6 per 1,000 in the former, to 3 per 1,000 in the latter, group.

A more striking numerical disparity was shown by the census of social defectives (prisoners, juvenile offenders, paupers and neglected children) May 1, 1905, viz., 8 per 1,000 in the eugenic group against 20 per 1,000 in the cacogenic group.

The population of the eugenic group is small (2,945 in 1910) as compared with that of the cacogenic group (15,415 in 1910); the eugenic group is falling somewhat, the cacogenic group rising somewhat, in general population.

The nativity of the general population in the two groups differs little, — 830 per 1,000:840 per 1,000, — but the eugenic group has a somewhat higher percentage of native-born parents, and a still higher percentage of native-born grandparents, and may, therefore, represent somewhat stabler stocks than the cacogenic group.

The general medical and social picture presented by the census of 1905 is distinctly worse for the cacogenic group than for the eugenic group, suggesting that the insanities and allied conditions are apt to occur in a background of more general diseases.

If we assume that active eugenic measures are the duty of society on the principles of self-preservation or of self-improvement, then such measures must begin somewhere. The present note has no measures to propose, but merely displays certain concrete social differences in different regions of Massachusetts. The prevailing laissez-faire policy cannot safely fall back on the idea that all the stocks are "just generally degenerating," and

that we "should not know where to begin." I should, therefore, advocate more intensive locality studies in Massachusetts as well as elsewhere, and the collection of social statistics through every public and private channel in preparation for that active eugenic program which the concrete data will be sure to indicate.

If there be a statistical correlation between insanity, crime, pauperism and disease, there may be a deeper causal relation

between some of these factors.

- Southard, E. E. The Significance of a Homoeopathic Foundation for Clinical Research and Preventive Medicine. Boston Medical and Surgical Journal, 1912, CLXVI, 585-587.
- SOUTHARD, E. E. The New Psychopathic Department of the Boston State Hospital. Boston Medical and Surgical Journal, 1912, CLXVI, 882-886.
- SOUTHARD, E. E., and CANAVAN, MYRTELLE M. Second Note on Bacterial Invasion of the Blood and the Cerebrospinal Fluid by Way of Lymph Nodes: Findings in Bronchial and Retroperitoneal Lymph Nodes. Boston Medical and Surgical Journal, 1912, CLXVII, 109-113.

SUMMARY.

- 1. Following the same technic adopted by Gay and Southard in their study of the post-mortem bacteriology of the blood and cerebrospinal fluid (100 cases), and that of Southard and Canavan in their study of the blood, cerebrospinal fluid and mesenteric lymph nodes (50 cases), the writers have studied the post-mortem bacteriology of 50 further cases, replacing mesenteric by bronchial lymph nodes, and 30 cases adding retroperitoneal lymph nodes.
- 2. The conclusion of two former papers is further established, viz., that post-mortem cultures from the cerebrospinal fluid are more likely to yield growths than cultures from the blood.
- 3. Just as the cerebrospinal fluid proved more frequently positive than did the mesenteric lymph nodes, so, too, the fluid remains more frequently positive than the bronchial lymph nodes (nota bene, the difficulty of taking cultures from the usually small available amount of lymph node material). Retroperitoneal lymph nodes, however, are found more frequently invaded than either blood or cerebrospinal fluid in our series. The 84 per cent positive retroperitoneal nodes (1912) are only exceeded by the

85 per cent positive cerebrospinal fluid series of Southard and Canavan (1910).

- 4. Both bronchial and retroperitoneal lymph nodes exceed the blood in frequency of positive cultures; the excess is, however, slight.
- 5. The most frequent two-out-of-three positive combination, found in 1910, was the combination of positive cerebrospinal fluid and positive mesenteric lymph node. This led to the hypothesis of a lymphogenous blood-borne invasion of organisms lodging in the meninges and later killed out in the blood by bacteriolytic substances.
- 6. This condition is reversed in the present series, where the combination of positive cerebrospinal fluid and positive bronchial lymph node is very rare.
- 7. The exceptional nature of our mesenteric node results was suspected when they were obtained, and was thought to depend somewhat upon the selected character of the nodes tested (large, succulent or easily palpable nodes were chosen for culture, and cases without such nodes omitted from the series). In respect to bronchial and retroperitoneal nodes, fewer cases had to be omitted on the score of unavailable nodes. It may perhaps be surmised, then, that the majority of bronchial and retroperitoneal lymph nodes examined were executing their defensive duties with considerable success, and were not letting through great numbers of organisms. The majority of mesenteric nodes in our series were doubtless reactive to unusual conditions, and were permitting more organisms to get through the lines.
- 8. The retroperitoneal nodes are on a different footing from the bronchial nodes in that they more frequently contain organisms (84 per cent versus 64 per cent). The combination of positive retroperitoneal node and positive cerebrospinal fluid is the most frequent two-out-of-three combination (recalling in this respect the mesenteric series).
- 9. Positive growth from all three loci were found in (a) mesenteric node combination, 55 per cent; (b) retroperitoneal node combination, 52 per cent; (c) bronchial node combination, 35 per cent.
- 10. These combinations of growths are of interest, whether one subscribes to the intravital or to the post-mortal invasion theory, since without doubt the tissues and their juices, including blood bacteriolysins, remain active for some time after apparent death.
- 11. Our results, as before, incline us to the idea of intravital significance of the organisms found. The statistics show similar

frequencies early and late post mortem, and the same high percentages of sterile cultures which the post-mortalist finds it so hard to explain.

12. Tables are presented showing the main types of organism cultivated. Special remark is made of a protracted period in which an anthrax-like organism kept appearing in certain autopsies. The question of ward and laboratory epidemics or pseudo-epidemics of saprophyte forms is brought up.

13. On the basis of this work important researches into intravital conditions can be imagined, especially in the field of bacteriemia and "low-grade sepsis."

SOUTHARD, E. E. Report of the Mentality of a Subject fasting at the Nutrition Laboratory of the Carnegie Institution of Washington, Boston, Mass., from April 14 to May 15, 1912. (Privately printed.)

REMARKS.

In brief, therefore, (1) there are no evidences of committable insanity in the subject; (2) some alienists might think the subject a psychopathic personality, but (3) the subject is probably an eccentric and not a psychopathic person. There are certain traces of psychic exhibitionism in the case. No erotic origin for this phenomenon was discovered, and it may better be taken on a more naïve basis as an exaggeration of a frequent phenomenon. The egoism was rather of a childish character. All signs pointed rather to vanity than to ambition. The subject belongs to a group of reformers and self-constituted saviors, and the ultimate decision as to his character must depend upon developments of psychiatric theory as to the intellectual, emotional and volitional significance of such reform tendencies. The odds at present favor an emotional basis for these tendencies.

1912-1913.

SOUTHARD, E. E. On the Somatic Sources of Somatic Delusions. Journal of Abnormal Psychology, Boston, 1912-13, VII, 326-339.

SUMMARY.

The writer has sought a series of cases of delusion-formation in which the false beliefs were such as to impute structural disorder to various organs (somatic or visceral delusions). Since no collection of correlations, however striking, is conclusive in the face of hosts of other non-correlations assumed to exist, resort was had to a statistical method. In a series of 1,000 autopsied cases, some 38 cases having characteristic somatic delusions, and not showing obvious brain lesions at autopsy, were found. Of these 38, 8 were found which were fairly free, at least concerning the correlations at issue, from complications with delusions of other types (personal or social).

In these 8 cases thus impartially drawn a statistical correlation can be safely stated to exist between such "somatopsychic" or severe "hypochondriacal" cases and serious somatic disease. It seems certain that these serious somatic conditions colored the lives of the patients.

In one group of cases (Cases I, II, III, possibly VIII) the psychic rendering of the somatic states is rather critical and temporary, and follows a process somewhat comprehensible to the normal mind. (Type: "Shot by a fellow with a seven-shooter," in a spot found to correspond with a patch of dry pleurisy.)

In others (Cases IV, V) the psychic rendering is less natural and is more a genuine transformation of the sensorial data into ideas quite new. (Type: "Bees in the skull" found in the case with cranial osteomalacia.)

In others (Cases VI and VII) the problem is raised whether severe hypochondria, with ideas concerning dead entrails and the like, may not often indicate such severe somatic disease as tuberculosis. The psychic rendering here is of a more general (apperceptive (?)) sort.

Hereditary predispositions, acquired dispositions, and manifold unexplained correlations must be clearly admitted. The concept of the crystallization of delusions around sensorial data of an abnormal sort must be entertained for some cases at least. It would not be safe to neglect these somatic data any more than it would be well to neglect the patient's turn of mind, his critical (though perhaps forgotten) emotional past experiences, or his ancestry. It might prove that the results of careful physical examination would have much to do with the diagnosis, or even the prophylaxis, of certain delusional conditions.

1913.

SOUTHARD, E. E. A Series of Normal-looking Brains in Psychopathic Subjects. Worcester State Hospital Papers, Contribution No. 11 (1912-13). Also in American Journal of Insanity, Baltimore, 1913, LXIX, 689-704.

Conclusions.

- 1. The main object of this communication is to stimulate interest in normal or normal-looking brains in psychopathic subjects, so that the question whether insanity is, or is not, always a matter of structural brain disease may approach settlement.
- 2. Normal-looking brains have now been found in a large fraction of senile dementia cases in two autopsy series, so that the "functionality" of these cases stands on as good a footing as that of various more generally recognized "diseases of mental function."
- 3. The issue in dementia præcox is now clearly defined, since one series (Worcester) might be interpreted to affirm the functionality, and the other (Danvers) to affirm the structurality ("organic nature"), of the disease in question.
- 4. Incidentally the question has arisen whether dementia præcox may not, on the ground of viability, be divided into dementia præcox brevis (with early death, say under two years from onset; katatonic form often here found) and dementia præcox longa (in which the subject dies, as a rule, more than eight years after onset, of a variety of causes; katatonic form less frequent).
- 5. Use has been made of a principle that apparent normality of brains may be consistent with fine microscopic changes, possibly of a reversible nature, and that we shall hardly from gross appearances be able to assert abnormality of brains unless at least three months (pre-indurative period) have elapsed from the onset of some cell-destructive process.
- 6. Use has been made of a principle to the effect that various nerve cells which are in all respects intrinsically normal may be essentially sharing in processes extrinsically abnormal.
- 7. The hypothesis is raised that the whole cortex, or even the whole nervous system, might be intrinsically normal but extrinsically abnormal in its reactions to a given chemical, physical or other condition.

- 8. It is possible that the solution of the problem of the functionality of various diseases might be to consider the structures involved as intrinsically normal whereas extrinsically abnormal—the normal operation of various cells leading to injurious effects in the organism as a whole.
- 9. It seems clear that the general statement "insanity is brain disease" is well-nigh meaningless unless the particular structures thought to be involved are specified, since it is clear that science has not discovered even the right place to look in certain diseases (no more in mental disease than in certain forms of, say, diabetes).

SOUTHARD, E. E., and STEARNS, A. W. How far is the Environment responsible for Delusions? Being Danvers State Hospital Contribution No. 38, 1913. Journal of Abnormal Psychology, Boston, 1913, VIII, 117-130.

Conclusions.

By choosing cases (from a group of 1,000 cases of mental disease autopsied at the Danvers State Hospital) on these grounds — (a) that the brains were normal or normal-looking, and (b) that the delusions recorded were purely or almost purely environmental (allopsychic) in scope — we have arrived at a small group of 13 cases suitable for analysis. In addition to these 13 cases there were 18 others (31 in all) which had been listed as almost purely allopsychic in scope; but of these 18, 8 had to be excluded as probably autopsychic (intrapersonal) in essence, 3 as imbecile, 4 as complicated by temperamental faults, and 3 as influenced by cranial or meningeal disease.

Of the 13 more truly allopsychic cases, 6 showed close correlation between previous history and contents of delusions, but the others failed to show such correlation.

The problem at once arises whether concealed or unknown personal factors may not have had much to do with these seemingly pure allopsychic cases.

Whether delusions often spread inwards (egocentripetally) or habitually outwards (egocentrifugally) becomes a problem to be studied along these same statistical lines.

The paucity of pulmonary lesions in this group and the great frequency of cardiac and renal lesions suggest further problems of a more difficult nature.

- Southard, E. E. The Outlook for Work at the Psychopathic Hospital, Boston, 1913. Being Psychopathic Hospital Contribution, 1913.14. Boston Medical and Surgical Journal, 1913, CLXIX, 427, 428.
- Southard, E. E. Mental Disease of Somatic but Extra-nervous Origin (Somatic Psychoses). White and Jelliffe's Modern Treatise of Nervous and Mental Disease, Philadelphia and New York, 1913, I, 518–528.
- Southard, E. E. Contributions from the Psychopathic Hospital, Boston, Mass: Introductory Note. Being Contribution from the Psychopathic Hospital, Boston, Mass., No. 1 (1913.1.) Boston Medical and Surgical Journal, 1913, CLXIX, 109-116.

SUMMARY.

The contributions of a psychopathic hospital like the new Boston institution are likely to emanate from the laboratory and to be of somatic trend. Their source will, however, be the patients themselves, since many psychiatric problems (e.g., those of speech) are hardly workable in lower animals. These clinical problems are bound to be of a wide range on account of the representativeness of the clinical material, — the drainage-product, namely, of a metropolitan district. German models are available, and articulation with the State system of government carries with it sundry advantages.

The juxtaposition of the medical and social points of view must direct our progress. Local influences (Massachusetts General Hospital, Boston Dispensary) are of especial advantage.

We are not so happy in possessing as yet few competitors; nothing like the number of psychiatric observers (and of clinics for such observers) can soon be hoped for in America as are to be found in German-speaking countries.

Juxtaposition of scientific establishments for medical research characterizes the recent Boston developments in which the medical schools, various privately endowed institutions and the Commonwealth have shared. Various examples are cited in the text of men working in adjacent institutions, whose work should be a stimulus to ours.

The traditions of Massachusetts in psychiatry are, however, by

no means negligible. Examples are offered in the text of men who have set the more recent traditions.

A rough statistical analysis of contributions by these more recent Massachusetts worthies, and of contributions by workers contributing to three separate sets of State hospital Festschrift papers, serves to demonstrate that about one-half of all these contributions have dealt with matters of nerve structure.

The paucity of sociological and psychological contributions is clearly in evidence. To secure a more even development of psychiatry, these latter should be stimulated, though naturally our somatic studies should not be permitted to lag.

Lucas, W. P., and Southard, E. E. Contributions to the Neurology of the Child. III. Further Observations upon Nervous and Mental Sequelæ of Encephalitis in Children. Boston Medical and Surgical Journal, 1913, CLXIX, 341–345.

RESULTS.

The facts elicited are surely striking, and are significant in the following ways: —

- 1. They illustrate the importance of what might be called sequence studies.
- 2. A further study has brought to light one more case of epilepsy, making 10 per cent of our present total, a figure not inconsistent with general statistical expectation.
- 3. On the same general statistical grounds we might have predicted that our number of mentally backward children would increase as the number investigated grew. In this group we now have five children, two of whom are feeble-minded without any signs of epilepsy, and three are cases of marked mental retardation or backwardness. (Not reaching the grade of feeble-mindedness imbecility of English writers.) This gives 28.5 per cent of the living children who show marked mental defects.
- 4. There are four (or 15 per cent) of these cases that show less marked residual effects from their encephalitis, (a) either by excessive "nervousness" or (b) because they show a much shorter reaction period to fatigue.
 - 5. Two (or 7.1 per cent) still show motor sequelæ (strabismus).
 - 6. There are 28.5 per cent who have died.
- 7. Only six (or 21.5 per cent) of the children show no signs of their previous attack, and are apparently normal in every way.
 - 8. Tabulation of these results is as follows: —

Epilepsy, Nos. 7, 8, 13 or 10.7 per cent, or 7.1 per cent not counting 13. Feeble-minded, Nos. 5, 20 or 7.1 per cent.

Backward, Nos. 6, 4, 28 or 10.7 per cent.

Nervous or easily tired, Nos. 15, 17, 31, 24 or 14.6 per cent.

Strabismus, Nos. 1, 16 or 7.1 per cent.

Normal, Nos. 9, 3, 18, 19, 22, 23 or 21.5 per cent.

Dead, Nos. 2, 10, 11, 14, 25, 26, 27, 29 or 28.5 per cent, or 25 per cent without No. 2.

28.5 per cent show marked mental defect.

50 per cent show some stigmata.

21.5 per cent are normal.

28 per cent died.

- 9. These results impel further investigation of these cases and of any other ones we may have occasion to follow from time to time. Our first endeavor has been to learn the dimensions of this problem (compare Lucas' work on sequelæ of syphilis¹) rather than to study any portion of it intensively. We now plan to make intensive studies on the cases we have so far followed, and to individualize these more general conclusions.
- Southard, E. E. Second Note on the Geographical Distribution of Mental Disease in Massachusetts, 1901–10. The Insanity Rates of the Smaller Cities. Read before the Demographic Section of the Fifteenth Congress of Hygiene and Demography, Washington, D. C., September, 1912 (to be published also as a part of the Transactions of the Congress). The work is a sequel of work on "The Insanity Rates of Massachusetts Towns," read before The Eugenics Section of the American Breeders' Association at its Eighth Annual Meeting, Washington, D. C., December, 1911, and published as "Note on the Geographical Distribution of Insanity in Massachusetts, 1901–10," Boston Medical and Surgical Journal, March 28, 1912. Boston Medical and Surgical Journal, 1913, CLXIX, 302–306. Also in Transactions, Congress of Hygiene and Demography, 1912, VI, 217–226.

Conclusions.

1. As from the towns, so also from the cities is there a marked variation in the number of insane contributed to the State institutions.

¹ Contributions to the Neurology of the Child. II. Note on the Mortality, and the Proportion of Backward Children, in a Series of Congenital Syphilis followed subsequent to Hospital Treatment; from the Out-Patient Department of the Children's Hospital and the Department of Pediatrics, Harvard Medical School, by William Palmer Lucas, M.D.

- 2. The range of variation is far smaller for the cities (3.5 for Chicopee and Pittsfield to 9.8 from Chelsea per 1,000 inhabitants in a period of ten years) than for the towns (0 in the case of 12 towns to 16.4 or higher in other towns).
- 3. The treasury of the Commonwealth would be favorably or unfavorably affected by political geography as follows: Most favorable to the treasury would be: (1), certain rural conditions where the apparent Utopia of no commitments prevails: next. (2), the conditions of certain cities (e.g. Chicopee and Pittsfield) would be apparently most favorable, unless it can be demonstrated that special commitment habits there prevail, favorable to the purse directly, but indirectly unfortunate for the community; (3) more likely to approach the community's ideal are the conditions of the suburbs of Boston, which seem to produce even less insane than (4) the towns in general, which are exceeded a little by (5) the non-metropolitan towns of the State at large; (6) the cities of the metropolitan district outside Boston are less productive of commitments than (7) the average for the Commonwealth as a whole; or (8), that for all cities; (9), the metropolitan district as a whole; (10), the metropolitan cities, including Boston; (11), Boston; (12), Chelsea; (13), certain rural conditions.
- 4. Accordingly, it is safe to say that "rural degeneracy" is focal, but not universal, in Massachusetts, and that, on the whole, the towns are better off than the cities as commitment producers.
- 5. Certain cities can be picked out as proper subjects for intensive study: (a) low-rate cities, Chicopee and Pittsfield, must be compared, as well as (b) Lawrence and Waltham, yielding the Commonwealth's average rate; (c) all seven cities having a rate lower than the general town rate should be studied; (d), Salem might be of interest as having the average rate of all cities; (e), Holyoke, that of all towns; (f), there are surprising contrasts in the output of various seaports.
- 6. The attempt to utilize the census enumerations of (a) social defectives and (b) physical defectives as correlative with the official commitment rates is fairly successful, and yields a degree of confidence in the census enumerators (1905) which is comforting.
- 7. The number of physical defectives found living May 1, 1905, used as exemplifying conditions in the decade, is found to vary up and down with the insanity rate in the different groups

of cities; the number of social defectives appears to remain more nearly constant.

- 8. Comparison of the towns with the cities seems to show that, while cities are committing more insane than towns, they harbor fewer social and physical defectives than the towns. This may perhaps mean that cities have more effective means than towns of getting rid of all sorts of defectives. If this be the case, then we may permit outselves renewed confidence in the census statistics.
- 9. Another suggestive correlation is that between the towns in general and the seven low-rate cities. The seven cities distinguished by low commitment rates are also distinguished by low rates of surviving social and physical defectives, and the latter rates are lower than those of cities in general.
- Southard, E. E. Medical Contributions of the State Board of Insanity of Massachusetts: Introductory Note. Contribution of the State Board of Insanity of Massachusetts No. 1 (1913.1). Also in Boston Medical and Surgical Journal, 1913, CLXIX, 537-540.

SUMMARY AND REMARKS.

A general picture is offered of the medical scientific activities of the State Board of Insanity of Massachusetts. The duty of investigation and publication as prescribed by law, and the special duties of the pathologist to the board, are summarized.

A general summary of the various pieces of investigation before and after the special appropriation was made is given. It is estimated that over twenty-five workers have contributed to various aspects of the different investigations. The investigations are listed under fourteen heads, of which eight relate to work done subsequent to the special appropriation.

It is impossible that studies of this particular type and range shall be carried out without special funds, such as the New York Lunacy Commission and the Massachusetts Board of Insanity provide. It is hoped that other States will be prevailed on to establish a similar policy. The amount of money necessary for such investigations is negligible as compared with the money spent on maintenance; the results, however insignificant they may appear at a given moment, are bound to be some day of importance.

It is planned in future to publish various medical contributions from the State Board of Insanity in various appropriate journals with serial numbers so that readers may readily refer back to earlier contributions.

Southard, E. E., and Canavan, Myrtelle M. Bacterial Invasion of Blood and Cerebrospinal Fluid by Way of Lymph Nodes, Findings in Lymph Nodes draining the Pelvis. Journal of American Medical Association, Chicago, 1913, LXI, 1526–1528.

SUMMARY AND REMARKS.

- 1. The continuation of our former works shows that the cerebrospinal fluid (72 per cent) still leads the heart's blood (68 per cent) in percentage of positive cultures (routine aërobic methods, post-mortem material).
- 2. Pelvic lymph nodes (like mesenteric nodes in our former work) lead both blood and spinal fluid (75 per cent).
- 3. This is possibly due to the great percentage of pelvic lesions in the present series (20 out of 25 cases; 15 of the 20 showing organisms in pelvic lymph nodes).
- 4. It is still uncertain whether these findings indicate antemortem or post-mortem invasions. Of course an acute or chronic lesion may conceivably help the penetration of organisms from without.
- 5. If (as seems likely) the invasions are intravital or agonal, then it would appear that the pelvic lymph nodes are accustomed to harboring many bacteria (compare the mesenteric lymph nodes in an epidemic of dysentery).
- 6. Whether this habit of receiving more organisms than other nodes induces any superiority on the part of these nodes in respect to their power of digestion we cannot say. If so, a rationale for Fowler's drainage position (upper part of abdomen maintained higher than lower part) might be imagined. Such a rationale would be superior to saying that the pelvic peritoneum is a better filter than others, or is differently constructed from peritoneum elsewhere.
- 7. The pelvis, often subject to acute and chronic disease in the insane, appears to supply its lymph nodes with very numerous bacteria (both motile and non-motile and of many groups). Some of these are saprophytes, some doubtless pathogens; they are often found in the cerebrospinal fluid post mortem, even

when absent (destroyed (?)) in the blood. The pelvis compares, under the random conditions studied, with the intestinal tract in its habit of supplying bacteria to regionary lymph nodes; and perhaps the pelvis surpasses the intestinal tract, since the latter's lymph nodes happened to be studied during an epidemic of intestinal disease which provided an excess of secondary invaders.

8. The hypothesis of a route of meningeal invasion by way of the blood receives added support from this work, although the possibility of more direct invasion must be considered.

SOUTHARD, E. E. On Institutional Requirements for Acute Alcoholic Mental Disease in the Metropolitan District of Massachusetts in the Light of Experiences at the Psychopathic Hospital. Being Contribution from the Psychopathic Hospital, Boston, Mass., No. 34 (1913.34). Boston Medical and Surgical Journal, 1913, CLXIX, 937-942.

Conclusions.

Alcoholic mental disease forms at present about one-ninth of the Psychopathic Hospital's work (217 in 1,829 admissions during sixteen months). Over 50 cases of delirium tremens have been admitted against the law governing these matters, either on the ground of common humanity or because of errors in the very difficult differential diagnosis between delirium tremens and the more protracted disease alcoholic hallucinosis (which latter is regarded as suitable for the Psychopathic Hospital). A number of devices have been adopted at the hospital to minimize this error in diagnosis and to increase our knowledge of the two conditions (distinctive between "short" and "long" cases (Stearns), work of clinical historian, social service, and eugenics worker, the Myerson-Eversole pupil reaction, etc.).

The mortality of alcoholic cases at the Psychopathic Hospital has been extremely low (about 5 per cent). The mortality in delirium tremens and alcoholic hallucinosis is virtually nil (0 per cent). A high mortality attended our Korsakow cases (about 35 per cent); this curious fact demands a special investigation.

These results are superior to those of general hospitals, and this superiority we attribute to our methods of treatment, chief among which we place hydrotherapy.

The moral and economic value of saving these cases needs no

emphasis. The acutely insane are now accorded in most communities better treatment than are drunkards and cases of delirium tremens, despite the fact that the latter are economically more promising in the light of after-care results.

A hospital for acute alcoholic mental disease is recommended for the metropolitan district as a first step to the proper care of these cases throughout the State. Such a hospital should, in addition to its high medical standards (non-restraint, non-drugging), uphold the highest social standards by applying in its out-patient department the now well-established principles of after-care for alcoholics.

- SOUTHARD, E. E. The Psychopathic Hospital Idea. Being Contribution from the Psychopathic Hospital, 1913.26. Journal of American Medical Association, Chicago, 1913, LXI, 1972-74.
- SOUTHARD, E. E., and TEPPER, A. S. The Possible Correlation between Delusions and Cortex Lesions in General Paresis. Journal of Abnormal Psychology, Boston, 1913–14, VIII, 259–275.

Conclusions.

- 1. The present study of types of paranoia in general paresis, coupled with a former study of the sources of somatic delusions in a series of subjects with relatively normal brains, suggests that somatic delusions lie somewhat apart from other types (autopsychic, allopsychic) in that there may usually be found for somatic delusions a peripheral basis (organic lesions of soma, lesion of receptor paths, lesion of central receptive apparatus of cortex).
- 2. Accordingly, the diagnostician will proceed with unusual care to the discerning of such underlying lesions, although the above studies abundantly indicate that years may elapse before such lesions are manifest, e.g., at autopsy.
- 3. The characteristic delusions of general paresis (found in 57 per cent of a *routine* series) are autopsychic.
- 4. The distribution of gross cortex-lesions in autopsychic and non-autopsychic cases gives some color to the hypothesis that autopsychic delusions must be correlated with frontal lobe lesions.

Southard, E. E. Psychopathology and Neuropathology: The Psychopathic Hospital as Research and Teaching Center. Being Contribution from the Psychopathic Hospital, Boston, Mass., No. 2 (1913.2). Read at the Conference of the National Committee on Mental Hygiene at the College of the City of New York, Nov. 13, 1912. Proceedings, Mental Hygiene Conference and Exhibit, New York, 1912, 137-146. Also in Boston Medical and Surgical Journal, 1913, CLXIX, 151-154.

ABSTRACT.

Theoretical and practical objects of the mental hygiene move-That movement more than elaboration of the obvious. Some training in fundamental medical sciences desirable for all educated persons. Supervision by schools for social workers of lay workers in the medical field. Lowering the age of graduation in medicine desirable to leave time for a little research before money-making. Improvement advocated in the correlation of studies of the nervous system in medical schools. Every medical faculty should have at least three members fundamentally interested in the nervous system. Practical work in psychiatry. Proper medical school arrangements for psychiatry greatly dependent on the existence of a psychopathic hospital. No one model possible or desirable. The new Boston arrangements. Branches of activity of the Psychopathic Hospital in Boston. Some practical conclusions already arrived at since opening the hospital in June, 1912. Novel conclusions: importance of pediatrics in relation to psychopathic hospital work (e.g., Lucas' Boston Dispensary Clinic for Adolescents), possibility of prophylactic work in cases on older hospital records as having had nervous disease. Research should be, not merely permitted, but fostered.

SOUTHARD, E. E. What Parts of the Brain does Introspection reach? (Abstract.) Psychological Bulletin, 1914, XI, 66, 67.

Southard, E. E., and Bond, E. D. Clinical and Anatomical Analysis of 25 Cases of Mental Disease arising in the Fifth Decade, with Remarks on the Melancholia Question and Further Observations on the Distribution of Cortical Pigments. Being Danvers State Hospital Contribution No. 40. American Journal of Insanity, Baltimore, 1913–14, LXX, 779–828. Also in Proceedings, American Medico-Psychological Association, 1913, 265–314.

SUMMARY AND CONCLUSIONS.

- 1 We have reviewed a group of 25 cases of mental disease (Danvers State Hospital material), so selected as to offer a fair sample of mental diseases arising in the fifth decade of life.
- 2. Our principle of selection excluded all cases which were obviously not characteristic of the fifth decade (paresis, alcoholic mental disease, and the like); the group of non-characteristic cases thus excluded was extremely large (approaching 80 per cent of all cases arising in the decade), and the preventable diseases alone amounted to over 60 per cent.
- 3. We remained with a group of 25 cases (10 males and 15 females) which present certain common aspects. These cases may be negatively defined as not due to syphilis, alcohol, cerebral arteriosclerosis, brain atrophy, or other factors yielding coarse brain disorder; as not possessing pronounced schizophrenic features; as not uniform in course or outcome; as not likely to show either elation or expansive delusions. They may be positively defined as almost, if not quite, constantly subject to delusions at some stage in each case; as yielding manic-depressive traits in the large majority of cases; as prone to depressive features; as possessing a strong hereditary taint (74 per cent of properly studied cases); as not infrequently suggesting disorder of glands of internal secretion.
- 4. The delusional features, present in all cases (save one of myxedema), were not characteristically of any particular form; the delusions were somatic in 14 cases; dealt with various alterations of personality in 14 cases (combined with somatic delusions in 8 instances); and (superficially at least) dealt with the social environment in 13 cases (6 times combined with other forms).
- 5. As to somatic delusions, it is further of note that a physical basis could be recognized for many of them in diseases of the viscera; and that, on the whole, these visceral counterparts of the delusions were more serious than the patients' complaints themselves.
- 6. Delusions of negation (5 instances) and of unreality (4 cases) do not bulk so large statistically as they are apt to in descriptions of so-called involution-melancholia.
- 7. The group, taken as a whole, is far more suggestive of manic-depressive insanity than of dementia præcox or of any other form of mental disease.
 - 8. On the whole, depression is the most common manic-depres-

sive feature of these cases; but the constant occurrence of various delusions alongside the depressive emotions makes the latter seem far from "causeless," certainly not so causeless looking as the depressions of manic-depressive insanity.

- 9. It cannot be dogmatically asserted, but, on the whole, these patients seem more dominated by various ideas and by various more or less false beliefs than are the manic-depressives of earlier decades, and are perhaps more victims of intellectual than of emotional or volitional disorder. However, this may be more appearance than reality, and further work may again pull the emotions, and particularly the depressive emotions, into the genetic foreground.
- 10. As to the designation "involution-melancholia" for these cases, it may be surmised that the term was adopted by alienists having unpleasant delusions at least as much in mind as unpleasant MERE emotions. Perhaps it is unwise to seek to overthrow the classical term before more intensive work has been done on the actual relation of the intellect to the emotions in this group. How far, then, it may be asked, is the melancholia of involution merely systematic and responsive to intellectual conditions?
- 11. Since Freud has claimed a sexual basis for paranoia, and even perhaps for paranoic states falling short of paranoia, it is fair to inquire how far the present group has a sexual basis. Three of the 15 female cases in our series harbored rather systematic delusions of persecution, and all three systems had a sexual tinge. This fact, allocated with the not infrequent tendency to disorder of glands of internal secretion in certain cases, ought to provide a fruitful field for psychoanalytic hypotheses.
- 12. Hallucinations, as a rule auditory, were observed in something like 60 to 70 per cent of the cases. There are à priori reasons (Wernicke) for relating these with the unpleasant delusions characteristic of the group; but whether the false beliefs irradiate over to incite the hallucinations, or whether the hallucinosis is a prime factor in producing the false beliefs, must remain an open question. Statistically we should be forced to favor the former process.
- 13. The post-mortem data throw some light on the negative definition of our group (see paragraph 3 supra). There appears to be little or no evidence that the metabolic disorder, if there be such underlying this group, tends to brain wasting.
- 14. Our study of the distribution of certain chemically ill-defined lipoids (or pigments, as we have called them) shows that

age plays some part in the amount of deposits, perhaps more in the neuroglia cells than in the nerve cells, and least of all in the perivascular phagocytes.

- 15. All cases living three years or more after onset of symptoms show more or less marked accumulations of pigment in neuroglia cells. The same cases show a greater variability in the nerve-cell accumulations. Occasionally such a three-year or over-three-year case will show a negligible amount of pigment in perivascular phagocytes.
- 16. These pigment-findings are in substantial agreement with those of Southard-Mitchell, 1908: —
- (a) "Perivascular cell pigmentation almost uniform in different areas of the same case." The present series presents only two instances of marked variability from area to area.
- (b) "Neuroglia cell pigmentation . . . varies more or less directly with age." Our present group presents more variation than did the former; there is, however, no absolutely negative case over forty-six years of age.
- (c) "Nerve-cell pigmentation is not a function of age." Two cases of fifty years or more showed no appreciable amount of pigment, and three others showed but slight amounts. The variations in amount within a given brain are more striking than the variations shown by the neuroglia cell pigments.
- 17. That these three loci for the deposition of pigment tend at last to a species of saturation is indicated by the fact that the even degrees of moderate or of marked pigment deposit in all loci begin to appear in the later years of life (one case at forty-nine years, one at fifty-six, and the rest from fifty-nine to seventy-five years).
- 18. The fresh point of view thus obtained for the problem of involution-melancholia by our study of fifth-decade insanities may be stated as follows: —

Involution-melancholia has been regarded as possibly akin to manic-depressive insanity, or even identical therewith, or as possibly something quite different. Perhaps the majority of psychiatrists would regard it as a disease akin to manic-depressive insanity, but modified by climacteric or presentle changes, and distinguished from manic-depressive insanity by the peculiar tendency to depression which has given it its name. The novel feature of our investigation has been to study the age-factor. We have studied unselected cases arising in the fifth decade of life, excluding all coarse organic cases of brain lesion. Our re-

sultant group is, we believe, although small, otherwise ideally representative of the conditions underlying mental disease at this age-level. Our group includes a sufficient number of the familiar cases of involution-melancholia as well as cases of delusional insanity without melancholia. The striking fact is that the melancholia cases prove also delusional. In so far as our group is representative of the fifth decade, we believe that the essential psychopathia involutionis is characterized by delusions; that in the large majority of cases melancholia is a feature superadded to the delusions; and that in a smaller majority of cases hallucinosis also occurs. The fact that melancholia may assert itself as the most prominent symptom in the clinical foreground fails to controvert the possible genetic importance of the delusions. to the cause of psychopathia involutionis, it is easy to invoke the glands of internal secretion; and of their disorder there is actually some sign in a number of cases. Whether such disorder or some unknown factor determines the overpigmentation (lipoid accumulations) in the cortex above noted, and whether these deposits have a direct relation to the symptoms, must rest with the future.

SOUTHARD, E. E. The Mind Twist and Brain Spot Hypotheses in Psychopathology and Neuropathology. Being Contribution from the Psychopathic Hospital, No. 42 (1914.8). Psychological Bulletin, Princeton, N. J., and Lancaster, Pa., April, 1914, XI, 117-130.

SUMMARY.

I am sure that some of the dozen or more separate conceptions to which I have asked attention in the above review will hardly carry conviction in the present sketchy form.

1. The mind-twist versus brain spot hypotheses have nowhere been discussed in extenso (although see articles on "The Problems of Teaching and Research contrasted, and a Study of the Dementia Præcox Group," etc., mentioned in text), and I am not sure that the distinction will strike the reader as more than a fresh sample of psychophysical parallelism. Without special title to a viewpoint, I wish, however, to say that personally neither parallelism nor interactionism seems to me safe ground, and that some kind of identity hypothesis for all the operations concerned would be better consonant with my views. One thing will be clear from the above sketch, viz., that it may well be possible that mental operations of the introspective kind are not

correlatable (in any sense) with a good part of the operations of the cerebral cortex.

- 2. The definition of consciousness as equivalent to cognition and compounds of cognition leaves the non-cognitive portions of the mind (will and emotions) only capable of introspection by the kinesthetic and allied sensorial routes. But whether the above definition is correct or not, it is at least clear that many authors in the past have confused the issue by identifying mind with consciousness at a stage when neither concept was capable of exact statement.
- 3. The pathological evidences which have absorbed my personal attention have led me to a re-emphasis of the Flechsig concept of anterior and posterior association centers; to a natural correlation of consciousness and the entire sensory portion of the mind with activities of the posterior association center; and to a similar correlation of non-conscious, i.e., objectivistic or behavioristic portions of the mind (notably the voluntary faculties) with activities of the anterior association center. The prepallium (pre-Rolandic cortex) would thus be more closely related with behavior (kinetic and pragmatic schemata), and the postpallium (post-Rolandic and infra-Sylvian cortex) most closely related with consciousness.
- 4. But if the prepallium is more an organ of behavior than the receiving postpallial mechanism, it is expressly to be stated that the capacity for novelty production, or innovating power, is not to be abstracted from the prepallial neurones. Such innovating power, exquisitely mental as it seems, is not necessarily conscious in the sense of essentially cognizable. It is perhaps only the history of our innovations and inhibitions which we register in the postpallial mechanisms. Arguments in this direction are to be drawn from the decisive ruin of the personality which attends prepallial destructive processes in general paresis of the insane.
- 5. A sketch is offered to show that the non-conscious, *i.e.*, non-cognitive, side of delusion-formation is perhaps more important than the conscious (or contentwise) side. At least, the morbid correlates of delusion-formation seem to be prepallial rather than postpallial disorder as a rule.
- 6. The reverse seems to hold for such apparently motor or behavior phenomena as epileptic and cataleptic phenomena. These are possibly based more often on postpallial (sensorial (?), kinæsthetic(?)) disorder than on intrinsic disorder of behavior mechanisms.

Southard, E. E. Eugenics v. Cacogenics: An Ethical Question. Being Contribution from State Board of Insanity, Boston, Mass., No. 21 (1914.1). Journal of Heredity, Washington, D. C., September, 1914, V, 408, 414.

SUMMARY.

- 1. The eugenics propaganda presents ethical difficulty in view of our ignorance not merely how to breed better men, but actually what improvement or improvements we seek.
- 2. The plant and animal breeders know what they are breeding towards, and hence face problems of technique only; the eugenist, it may be feared, does not know to what he ought to breed (unless we are content with generalities like "citizenship" or "brain-power").
- 3. The British origin and historical setting of the eugenics movement suggests that eugenics is an outcome in one sense of British utilitarianism, although there are certainly no Malthusian or race-suicide components in the theory.
- 4. The chances are that the ethical basis of eugenics lies more in the evolutionistic than in any utilitarian doctrines, and that, just as an ethics of self-development is superior to an ethics of happiness-seeking, so an ethics of race-development is superior to an ethics of the greatest good to the greatest number (at least if good be defined as anything short of full development).
- 5. At all events, the warning deserves utterance that no narrow nationalistic or chauvinistic interpretation of the eugenic aim should be allowed to prevail, as, for example, that British eugenics is German cacogenics and vice versa. The eugenic evolution should rather be to develop each nation to the death-point of national prejudice and to the maximal vitality of co-operation.
- 6. To clarify this ethical situation, certain distinctions need to be drawn. Both in the matter of eugenics and in that of cacogenics it is proper to distinguish a relative from an absolute form.
- 7. Thus the breeder of draught-horses might consider speed-producing factors as interfering with his plans, as relatively cacogenic, whereas he might well acknowledge that another breeder would find such factors relatively eugenic and draught-horse factors relatively cacogenic. Similarly, should the white race go down in its heredity, Caucasian cacogenics might prove Semitic or Ethiopian eugenics, but always in the relative sense of these terms.

- 8. It would accordingly be wiser to consider the problem of eugenics in the absolute sense within the species. Cacogenic factors in human progress would not be merely factors which for arbitrary reasons are considered proper to exclude, as, for example, short men, with prognathous jaws, etc.: for here the cacogenics would be merely relative.
- 9. What we must study to avoid are the absolutely cacogenic factors, such as pathology in its widest sense might discover. Examples of such absolutely cacogenic factors are:—
- (a) Possible senescence not in somatic cells only, but in the germ-plasm itself.
- (b) Possible prepotently toxic powers in a gamete, such that all zygotes in which such gamete was a component would produce morbid individuals out of all theoretical proportions.
- (c) Possible inheritance of qualities acquired, not by the somatic cells, but by the germ-plasm (e.g., through alcoholism, syphilis).
- 10. This contrast between relative cacogenics and absolute cacogenics reminds one of the contrast between the pathology of measurements and anomalies and the pathology of survival-values for cells, organs and the organism.
- 11. It may well be that the pathology of survival-values is theoretically reducible to a metric basis, and that these survival-values can be put on a "more-or-less" rather than on an "all-or-nothing" basis. There is, nevertheless, an important sense in which the pathology of anomalies is distinct from that of life and death.
- 12. Accordingly, I propose that the logical technique of pathology be applied to the problems of absolute cacogenics, such problems as those mentioned in paragraph 9 above, to the end that more may be understood as to the essential pathology of the germ-plasm.
- Southard, E. E. Statistical Notes on a Series of 6,000 Wasser-•mann Tests for Syphilis performed in the Harvard Neuropathological Testing Laboratory, 1913. Boston Medical and Surgical Journal, 1914, CLXX, 947-950.

SUMMARY.

1. On account of the varying standards and criteria which have held or will in future hold in the matter of Wassermann tests for syphilis, it has been thought wise to summarize the

materials, controls and special precautions used in the Harvard Testing Laboratory.

- 2. General doubts are often raised as to the reliability of Wassermann's test on account of the "great number" of "doubtful" reactions. This "great number" resolves in our large series to 4 per cent of the blood sera and 2 per cent of the cerebrospinal fluids.
- 3. On statistical grounds we find the "doubtfuls" resolve much more frequently into "negatives" than into "positives."
- 4. Twenty-three per cent of all sera examined were positive, and since the cases are in many instances picked as likely to be positive, this percentage is doubtless much higher than the community's total percentage.
- 5. Thirty-three per cent of all cerebrospinal fluids examined were positive. The principle of selection of these cases was such (positive serum or symptoms of "organic" nervous or mental disease) that the result is of practical value, stateable as follows: The chances of a syphilitic origin for a case of "organic-looking" nervous or mental disease are not more than 1 in 3.
- 6. The Massachusetts Reformatory for Women yields 44 per cent, a partial index of the infected nature, though not necessarily of the infectivity, of prostitutes and other delinquent women.
- 7. The Danvers State Hospital (for the insane) yields between 19 and 22 per cent positive sera in its routine intake of cases from Essex County.
- 8. The Worcester Asylum, a transfer institution (to which are transferred chiefly non-paretic cases), yields less than 3 per cent positive. If this percentage should be maintained in future work, one might infer that, from the group of persons in the community with insane tendencies and infected by syphilis, cases are drained off into the frankly paretic group, in such wise that a population of asylum transfers will be likely to show a low syphilis index. But this conclusion can be only tentative on account of many other issues.
- 9. The Psychopathic Hospital index (15 per cent) is perhaps somewhat closer to the general community index than the others just mentioned on account of the large number of cases "not insane" that are tested, but it is evident that 15 per cent would be too high an index to assign to the syphilis of the general population.
 - 10. Aside from its capacity to solve problems of individual

diagnosis, the Wassermann method is obviously of such value to the community that a community Wassermann service might well be undertaken by a State agency such as the Board of Insanity or the Board of Health.

SOUTHARD, E. E. Feeble-mindedness as a Leading Social Problem. Being Contribution from the Psychopathic Hospital, Boston, Mass., No. 38 (1914.4). Boston Medical and Surgical Journal, May 21, 1914, CLXX, 781-784.

SUMMARY.

I will sum up and conclude as follows: —

- 1. The status of the feeble-minded in Massachusetts is such as to offer a large and immediate practical problem.
- 2. The availability of Binet-Simon and other intellectual tests makes desirable the establishment of numerous dispensary centers for preliminary diagnosis, so that cases suitable for well-tried educational methods in our State schools may be winnowed out.
- 3. The criminalistic group has been singled out, hardly so far as a problem of the present, but as a problem of the future, dependent for solution on psychological data not yet available.
- 4. Estimates of the numerical size of the problem are available, and a promising preliminary survey is being made by the Board of Insanity.
- 5. Social sense of the importance of the problem has been aroused, though not, it may be hoped, to the point of impatience with the degree of progress humanly possible.
- 6. The interest of specialists in children's diseases has also been aroused, and the eventual results of certain children's diseases are being shown in the concrete case.
- 7. Workers in eugenics are being enlisted to study the hereditary factor in some of these so-called "acquired" cases, and, it is hoped, will solve the problem of the interplay of heredity and somatic factors in the pathology of feeble-mindedness.
- 8. Statistical inquiries seem to justify the idea of a *chiaroscuro* of distribution, which means that society is not just generally degenerating, and that the places to begin preventive work can be chosen scientifically.
- 9. Statistics tend to indicate that the problem is rather a medical than an economic one, or, perhaps better, more medical than economic, standing a bit one side perhaps from crime, some part of which is economic.

- 10. The interplay of hereditary and somatic factors promises to show lines of prevention both eugenic and environmental.
- 11. We can educate communities in eugenics and we can conceivably transplant, by a proper family-care system, feeble-minded persons from neighborhoods where they would unite with others of their kind to regions where they would either not marry or would marry normal persons, thus diluting the strain (feeble-minded males are probably less dangerous in the community than feeble-minded females, which latter should be segregated by preference in institutions).
- 12. Socialism of the Fourier-Marx type will have to reckon with this problem; it would not appear that communism has any ready solution for the problem of those who, being feeble-minded, are by nature neither free nor equal. On the other hand, some form of socialism of the St. Simon type, or what may be termed state socialism, is the most practicable form to cope with this problem. Indeed the practical solution of these problems of feeble-mindedness and allied defects is fast leading us to something of the sort, whether we choose to call it socialism or not. Yet how many would-be socialists face the congenital or acquired inequalities of men with frankness and clear understanding?

SOUTHARD, E. E. Considerations bearing on the Seat of Consciousness. (Abstract.) Journal of Nervous and Mental Disease, New York, 1914, XLI, 581.

ABSTRACT ONLY.

The reader attempts to correlate consciousness with the posterior association-center of Flechsig, and possibly rather more intimately with that of the right cerebral hemisphere. The reader views consciousness as a much narrower term than mind, and, if the term mind is to include knowing, feeling and willing, finds consciousness rather cognitive than affective or volitional, and believes that will and emotions appear to consciousness rather in a cognitive (kinesthetic) aspect than in any more profound or elementary manner. To put the matter concretely, the reader questions whether it is necessary to suppose ideas of words correlated in any sense whatever with operations of Broca's area. Broca's area contains, rather, the necessary kinetic schemata of words. Generalizing therefrom, the reader wonders whether any ideas either occupy or are in any sense correlated with activities of the anterior association-center, which contains, rather, the

various kinetic and pragmatic schemata that underlie voluntary action and conduct. Data from comparative anatomy and from casualty wards are advanced in support of this conception.

SOUTHARD, E. E. Conclusions from Work on the Paratyphoid Epidemic at the Boston State Hospital, 1910. Boston Medical and Surgical Journal, 1914, CLXXI, 556-559.

GENERAL CONCLUSIONS.

The epidemic of mild paratyphoid fever at Boston State Hospital in 1910 seems beyond question due to Bacillus paratyphosus, alpha (findings of Richards).¹

Apparently the source of the epidemic was infected meat, or else a patient with paratyphoid infection may have spread the epidemic through meat. The clinical features of the epidemic of greatest interest are presented in parallel columns. Mention may be here made of the fact that initial fever was practically constant. Anorexia, diarrhea, abdominal pain, general malaise and vomiting were not so frequent in this paratyphoid epidemic as they usually are in typhoid fever. Of special modes of onset which might be confusing in diagnosis, bronchitis may be mentioned. In the course of the disease stiff joints occurred in 19 of 30 cases of paratyphoid fever, whereas in typhoid fever, arthritis is rare. Four of the patients suffered from muscle pains in the back of the neck. Malaria was suspected in one case from the nature of the acute symptoms.

A case is presented which died some years after the epidemic and showed thickening of the ileum, possibly representative of former intestinal disease, but whose cultures, including that of the gall bladder, failed to show bacillus paratyphosus.

The clinical picture shows points of interest in the temperature curves. A case will occasionally have a beginning temperature suggestive of typhoid fever, but this is not the rule. The intercurrent bronchitis fails to affect the temperature reaction, so that it may possibly be supposed that it is a portion of the disease rather than a truly intercurrent phenomenon. But it must be remembered that insane patients show some differences in fever reactions to various infections from the reactions shown by sane persons.

Eight cases in 30 showed a peculiar drop of temperature to

¹ E. T. F. Richards: Bacteriology of Epidemic of Paratyphoid Fever, Journal Lancet, St. Paul, 1912.

subnormal in the second or third week — as a rule, between the tenth and fourteenth day. This temperature drop is accompanied by a drop in the pulse and by an access of the most severe subjective symptoms felt at any time in the disease.

The blood cell pictures show that there is no hypoleucocytosis or loss or drop in eosinophiles in paratyphoid fever (of the type here described), since the counts remain within the normal range; this point may be of some value in differentiation of paratyphoid fever from typhoid fever.

It was incidentally learned that the blood cell picture after antityphoid vaccination also failed to show hypoleucocytosis, but instead tends to show a slight initial rise in leucocytes.

The antityphoid fever vaccinations, carried out early in the epidemic as a possible protective measure, gave the opportunity for a few observations on the relation of paratyphoid fever to antityphoid vaccinations, and it would appear that there may be a moderate degree of crossed protection (typhoid vaccine against paratyphoid fever), since non-vaccinated persons were far more subject to paratyphoid fever than were persons vaccinated against typhoid. The rule was, however, not absolute.

SOUTHARD, E. E. The Association of Various Hyperkinetic Symptoms with Partial Lesions of the Optic Thalamus. Journal of Nervous and Mental Disease, New York, 1914, XLI, 617-639.

SUMMARY.

To sum up, the writer has made an orientation study of the symptomatology of a group of 25 cases of chronic diffuse optic thalamus lesion, and observed 96 per cent to show one or more symptoms of the hyperkinetic group (exaltation, irritability, psychomotor excitement, homicidal tendencies, destructiveness) and but 40 per cent to show depressive symptoms (including suicidal tendencies and apprehensiveness). To compare with these figures the writer studied the symptomatology of 261 cases having normal or normal-looking brains, and therein found only 64 per cent showing hyperkinetic symptoms and 52 per cent showing depressive and allied symptoms. The one exception to the thalamic correlation with hyperkinesis is hardly a fair exception, being a stuporous general paretic.

In evaluating these surprising results, it must be remembered that coarse destructive lesions, destroying through-routes for sensory impulses, have been omitted from consideration, and that two additional cases of chronic diffuse lesions of the thalamus failed to yield hyperkinesis apparently because of injury to the thalamocortical system above them.

The hyperkinetic symptoms are on theoretical grounds possibly due to withdrawal of corticothalamic "inhibitory" or "switch-setting" impulses, although another way in which the thalamic mechanism could be simplified is by atrophy or aplasia of certain cerebellar connections. This question is accordingly ripe for histopathological study.

The writer does not assume that hyperkinesis is always or often produced in the way indicated, but regards the work as pointing once more to the study of tissue-simplification with selective loss of neurones as contributing to the explanation of symptoms. Thus, if exaggerated knee-jerks are found correlated with simplification of spinal cord mechanisms, so more complicated forms of hyperkinesis may be found due to simplifications of more complicated structures.

Southard, E. E. Analysis of Recoveries at the Psychopathic Hospital, Boston: I. One Hundred Cases, 1912–13, considered especially from the Standpoint of Nursing. Being Contribution from the Psychopathic Hospital, Boston, Mass., No. 48 (1914.14). Boston Medical and Surgical Journal, Sept. 24, 1914, CLXXI, 478–483.

REMARKS.

Future analyses may be made more thorough, and the elements of recovery may stand out more clearly in detail. Suffice it to say that a superficial analysis like the present amply proves several points.

First. — The component of nursing cannot be omitted from these recoveries, brief as was the time of the hospital stay of the majority of cases. This is proved by the incidence of disorder of heat-regulation (fever, hypothermia) in at least 37 per cent of the cases.

Second. — The special value of nursing, and particularly of hydrotherapy, stands out from the results of the treatment of alcoholic psychoses, which though they form only about one-ninth of our problem of first care, represent almost nine-tenths of our early therapeutic results.

Third. — The recoveries in the so-called "recoverable" forms of insanity take too long to be represented in any numbers in

this first hundred of recoveries, and it may be suspected that the average hospital stay of three to four weeks is not sufficient for recoveries in groups like manic-depressive insanity.

Fourth. — The effect of psychotherapy as applied in the Psychopathic Hospital is not a rapid effect.

Fifth. — The percentage of syphilis in the recovered cases is exactly that of the total intake of the hospital, so that this factor cannot be said to influence treatment unfavorably (two questionable syphilitic cases are more fully discussed and reference made to Kraepelin's analysis of allied conditions).

Sixth. — Some index of the activities of our after-care service is afforded by the fact that nearly half of the patients either resorted voluntarily or (in some cases) were brought to the outpatient department at one or more periods subsequent to the discharge.

Seventh. — The need is apparent of nurses who shall build their psychopathic training on a sound basis of general hospital work (letter quoted, to the committee of superintendents, dealing with the general aspects of the nursing problem for the insane).

Lesions and Anomalies in Dementia Præcox, with Some Account of their Functional Significance. Being Contribution from the Massachusetts State Board of Insanity No. 25 (1914.5), and Danvers State Hospital Contribution No. 53. The substance of this contribution was presented at a meeting of the American Neurological Association held at the Triennial Congress of Physicians and Surgeons, Washington, D. C., May, 1913. American Journal of Insanity, Baltimore, 1914–15, LXXI, 383–403.

Conclusions.

- 1. The writer has followed up his earlier work on the dementia præcox group (1910) with a more systematic anatomoclinical study of 25 cases, having a view to (a) definite conclusions as to the structurality ("organic nature") of the disease, and (b) correlation of certain major symptom groups (delusions, catatonic symptom groups, auditory hallucinosis) with disease of particular brain regions.
- 2. As to (a), the structurality of dementia præcox, the writer feels that the disease must be conceded to be in some sense structural, since at least 90 per cent of all cases examined (50)

cases, data of 1910 and 1914) give evidence of general or focal brain atrophy or aplasia when examined post mortem, even without the use of the microscope.

- 3. Moreover, with the use of the microscope, the problem of the normal-looking remainder can perhaps be solved, since the only two normal-looking brains in the 1914 series of 25 yielded abundant appearances of cell-destruction and satellitosis in the cerebral cortex, which had not yet had time to be registered in the gross (cases of three weeks' and two months' duration, respectively).
- 4. The method of anatomical analysis in the new series is a more systematic one than has been hitherto employed, involving careful gross description of the fresh brain; careful preservation (by suspension from basal vessels) in formaldehyde solution; systematic photography to scale of the superior, inferior (cerebellum removed), lateral and mesial aspects before and after stripping the pia mater; study of all aspects of the brain as spread side by side in photographic form; further study of the preserved brains in the light of the photographic study; and eventual cytological or fiber studies of paired structures showing possible atrophy or aplasia.
- 5. The neuropathologist making such a brain analysis shortly discovers that there is often more to be learned from the gross than from the microscopic appearances, since, of two gyri, the one measurably smaller than the other (and therefore probably agenesic, aplastic or atrophic), the microscopic appearances may often be hard to diagnosticate, as the normal-looking gyrus at the time of death may be just undergoing a satellitosis actually indicating more disease than its shrunken fellow.
- 6. Nevertheless, the gross analysis gives one perfectly convincing evidence of some kind of lesions, leaving to other methods of study the decision as to the congenital or acquired nature of these lesions. Some 14 of the 25 cases may be regarded as in some sense maldevelopmental, so as to arouse the suspicion that the acquired atrophy was grafted on top of a congenital agenesia or aplasia; but, in the opinion of the writer, aplasia is indicated rather than agenesia. The potential victim of dementia præcox is probably born with the normal stock of brain cells, although their arrangement and development are at times early interfered with.
- 7. The atrophies and aplasias, when focal, show a tendency to occur in the left cerebral hemisphere. The coarse atrophy is

usually of only moderate degree, and often does not appreciably alter the brain weight, at least outside the limits of expected variation. In fact, the heart, the liver, the kidneys and the spleen tend to show greater loss in weight than does the brain.

- 8. More remarkable than the atrophy and aplasia of the cortex is the high proportion of cases of internal hydrocephalus (at least 9 cases) uncovered by the systematic photographic study of frontal sections.
- 9. There is no evidence that this internal hydrocephalus is due to generalized brain atrophy. It is possible that it begins more posteriorly. It is probable that it does not mechanically so much affect the frontal lobes. It is associated with cases of long duration, although not with all cases of long duration, and was never found in cases of brief duration. Clinically, the hydrocephalic cases are uncommonly catatonic, and the cases of marked generalized hydrocephalus were as a rule victims of hallucinations. Delusions, except fantastic delusions, were not prominent in this group. The clinical courses of these hydrocephalic cases were more than usually active and mutual, and were often interrupted by remissions.
- 10. The hydrocephalic brains were not in other respects particularly open to the suspicion of congenital disease; and, without adequate proofs, the writer is inclined to consider the hydrocephalus to be often an acquired hydrocephalus.
- 11. An ardent supporter of congenital features might claim that 19 of the 25 brains showed some sort of maldevelopmental defect. One impartial witness thought that 14 showed such. And even if all 9 cases of hydrocephalus be taken as acquired, we remain with 11 cases bearing pretty certain evidence of maldevelopmental defect. On the other hand, all but 6 cases showed signs of acquired lesion, and these 6 showed various microscopic changes of doubtful meaning, but certainly acquired.
- 12. One remains with the general impression that gross alterations are almost constant, and microscopic changes absolutely constant, and that the high proportion of gross appearances suggesting aplasia means that structural (visible or invisible) changes of a maldevelopmental nature lie at the bottom of the disease process. But this suspicion of underlying maldevelopment is only a suspicion, although a strong one, and the first factor for the theory of pathogenesis to explain is the gross and microscopic changes as they present themselves in the full-fledged case.
 - 13. Aside from left-sidedness of lesions and internal hydro-

cephalus, very striking is the preference of these changes to occupy the association-centers of Flechsig. For this there is probably good à priori reason in the structure, late evolutionary development, and consequent relatively high lability of these regions. The interest of these findings is still greater in the functional connection (see below).

- 14. In concluding this summary of the anatomical side of the study, the writer cannot forbear adding that he supposes many neurologists, hearing of "lesions," will at once imagine extirpatory lesions of a Swiss-cheese appearance or areas like those of tuberous sclerosis. At the risk of being charged with naïveté, the writer would again here insist that the lesions described, though never beyond the range of a skilful anatomist, are of a mild atrophic nature or in the nature of aplasias, requiring care and deliberation in their description and explanation, and often hard to grasp except where photographs of all sides of the brain may be compared at once and reference then made to the brains themselves. These lesions do not effect globar lacunæ in the cortical neuronic systems, but they are of a more finely selective character. Under the microscope it may be difficult to say, without elaborate micrometry, that one area is worse off than another; but convincing evidence of the gross convolutional extent of the process is got by the naked eye and by the finger.
- 15. The writer regards this work as putting the burden of proof on those who claim the essential functionality of dementia præcox, and is at some pains to couch objections to one formulation of these changes as "incidental," and to another as "agenesic." Nevertheless, the writer would not necessarily deny the value of those formulations which look on these cases as cases of faulty adaptation to environment.
- 16. As to (b), the functional correlations of this study, the results may be summed up by saying that strong correlations have been found to support the writer's former claims that (1) delusions are as a rule based on frontal disease, and (2) catatonic symptoms on parietal-lobe disease. An equally strong correlation (3) has now been found between auditory hallucinosis and temporal-lobe disease.
- 17. The writer's previous work had suggested a correlation between frontal-lobe disease and delusion-formation. This correlation is not so decided in the present series, since, although perhaps only 1 of the 25 cases failed to exhibit delusions, 7 of the remaining 24 failed to show frontal-lobe lesions. However,

2 of these 7, though grossly negative, were microscopically positive enough.

- 18. The findings indicate, accordingly, that there is a group of delusional cases such that even long duration does not determine a frontal emphasis of lesions. Five cases represent this exceptional condition; 3 of these 5 are probably best interpreted as cases of hyperphantasia in which, both à priori and by observation, frontal lesions are not characteristic.
- 19. On the whole, the correlation between delusions and focal brain atrophy (or aplasia capped by atrophy?) is very strong, particularly if we distinguish (1) the more frequent form of delusions with frontal-lobe correlations from (2) a less frequent form with parietal-lobe correlations.
- 20. The non-frontal group of delusion-formations the writer wishes to group provisionally under the term hyperphantasia, emphasizing the overimagination or perverted imagination of these cases, the frequent lack of any appropriate conduct-disorder in the patients harboring such delusions, and the à priori likelihood that these cases should turn out to have posterior-association-center disease rather than disease of the anterior association-center. This anatomical correlation is, in fact, the one observed.
- 21. The writer's previous work had suggested a possible correlation between catatonic phenomena and parietal (including postcentral) disease. Ten of 14 definitely catatonic cases yielded parietal or other post-Rolandic lesions; 2 were grossly negative, but microscopically altered; and indications of correlation appeared also in the remaining 2. Five of 7 clinically somewhat doubtfully catatonic cases yielded similar correlations. Four clinically non-catatonic cases yielded no parietal correlations. (It is worth while insisting that "catatonia" is here used to refer to a symptom, not to an entity or clinical group.)
- 22. Special interest attaches to cerea flexibilitas as a clearly definable form of catatonic symptom. Four of 5 cases yielded gross parietal lesions. The fifth case was one of the entirely negative cases in the gross, but showed very marked postcentral satellitosis microscopically. Two of these cases showed the gross emphasis of lesions in the postcentral gyri, thereby hinting at an explanation of cerea flexibilitas along the lines of a reaction to altered kinæsthesia or an altered reaction to normal kinæsthesia (depending upon such true analysis of intragyral cortex-function as the future may bestow).
 - 23. À priori one might expect a correlation between the char-

acteristic auditory hallucinosis found in many cases of dementia præcox and temporal-lobe lesions. In point of fact, 9 of 12 hallucinated cases yielded temporal-lobe atrophy or aplasia; and actually only 1 of the 3 others is a good exception to the rule (from the clinical standpoint), to say nothing of the fact that this case had ample microscopic changes in the temporal lobe.

- 24. Of the 13 non-hallucinating (auditory) cases, only 3, or at most 4, could be said to have temporal-lobe lesions suggesting the possibility of hallucinosis. Here we may appeal to the inadequacy of clinical work, or, better, to the non-suitability of the lesions, since no one would assert that we yet have any idea of the precise and intimate temporal-lobe conditions which permit hallucinations.
- 25. In these functional connections the more recent formulations of Kraepelin and of Bleuler have been reviewed, although the entire work was done without the benefit of their analyses. The present formulation appears consistent enough with either. It would seem that Kraepelin regards a correlation between auditory hallucinosis and temporal-lobe disease as already highly probable from the literature. He also goes so far as to incriminate the "central" region for motor disorders. But the present suggestions as to the possible kinæsthetic relations of catatonia and the special (frontal and parietal) correlations with delusion-formation are not suggested by Kraepelin from the literature available.
- 26. It is interesting to note that further study by the Munich workers seems to have drawn attention away from the *infrastellate* cortical changes sketched by Alzheimer for catatonia in 1897 to various suprastellate changes. The microscopic work done in the present study in connection with certain grossly negative cases indicates that the early phases of the process may very often look as if infrastellate change was to be the most striking product of the disease. This is perhaps due to a richer original supply of glia cells in these infrastellate layers. Later, when the process is less acute, it may often be found that suprastellate cell losses are much more in evidence than any striking infrastellate change.
- 27. As for the general position which this work would assume toward the functional conclusions of Bleuler, it would seem that a histopathological basis for "dissociations" or "schizophrenia" could be somewhat readily provided by the lesions found, since these are for long periods mild enough and sufficiently confined to the finer cortical apparatus to provide for the exquisite mental

changes of most cases. The main neuronic systems are often permanently preserved, leaving an irregularly and slightly simplified cortical apparatus, in which a few cell changes would naturally throw out of co-ordination a great deal of still intact apparatus. But the whole process often remains so mild as to permit re-establishment of relatively normal functional relations on a slightly simplified basis, the whole to be disturbed once more on the occasion of the death or disease of a few more cells. Very striking is the fact that the cells not attacked are, so far as we can see, normal enough.

28. This work is rather a study of genesis than of etiology, in the sense of modern medical distinctions between these branches of inquiry. It is a modest inquiry into factors, and does not rise to the height of ascribing causes. The writer will refer merely to some paragraphs in the text as to a possible ontological position concerning structure and function which the future may take. The deplorable thing is that some structuralists throw out of court all functional data and some (rather more!) functionalists tend to underrate the possible contributions of anatomy to this field. Luckily, science nowadays cannot long proceed merely à la mode.

29. In particular, to sum up, I would call especial attention to the following points: (1) the constancy of mild general or focal atrophies in cases lasting long enough to yield these; (2) the tendency to an exhibition of lesions somewhat more markedly in the left hemisphere; (3) the preference of the lesions for the "association-centers" of Flechsig; (4) the high correlation of auditory hallucinosis and temporal-lobe lesions, as also (5) of catatonia and parietal lesions (cerea flexibilitas, especially post-central), and (6) of the more frequent form of delusions and frontal-lobe disease; (7) the possible existence of a hyperphantasia group with parietal correlations, and of (8) a large internal hydrocephalus group with catatonic and hallucinotic correlations rather than delusional. A few more points can be got from the description of the plates.

SOUTHARD, E. E. Notes on Public Institutional Work in Mental Prophylaxis, with Particular Reference to the Voluntary and "Temporary Care" Admissions and the "Not Insane" Discharges at the Psychopathic Hospital, Boston, 1912–13. Being Contribution from the State Board of Insanity, No. 22 (1914.2). Journal of American Medical Association, Chicago, Nov. 28, 1914, LXIII, 1898–1903.

SUMMARY.

- 1. In the prophylactic division of mental hygiene the matter of voluntary admissions to hospitals for the insane holds a primary place. Their number is increased by the plan of supporting such at the public charge just as committed cases are supported, and is still further increased, and even doubled, by the provision of a modern psychopathic hospital (increase from 8 to 16 per cent of the total of voluntary and committed cases, experience at Boston Psychopathic Hospital).
- 2. A second prophylactic measure is the provision of proper temporary care for persons suspected of mental disease, as according to a unique Massachusetts temporary care law (first operative in 1911; see text). This provision has been eagerly employed in Massachusetts, more than doubling the number each year since enactment. The Psychopathic Hospital is receiving about two-thirds of all those thus received in Massachusetts, 1913.
- 3. Many important prophylactic questions relate to those thought to be insane but not proved to be. In this psychiatric borderland also lie many questions between insanity and feeble-mindedness. A large "not insane" group, namely, 570 cases among the first 2,500 discharges from the Psychopathic Hospital, has been reviewed to discern the general features of this psychiatric borderland of diagnosis.
- 4. Consideration is omitted of 372 additional cases regarded as recovered or improved after attacks of mental disease, although in one sense these cases are open to prophylactic measures, since the occasional review of these cases by a follow-up system must tend to help society, and may help the individual.
- 5. Of the 570 not insane cases, 179 were cases of feeble-mindedness of various grades, largely of the higher grades and including a large number of the so-called defective delinquents (more than fifty). In this connection it often becomes necessary to fight a bureaucratic tendency among social workers, who tend

to proceed on the erroneous assumption that an insane or a feeble-minded person belongs by definition in some public or semipublic institution.

- 6. The numerically next largest group is that of psychoneurotics (100), who are largely female (71), especially the hysterics (39 female in 45). Consideration is given to the idea of a public sanatorium or preventorium for such persons with far larger provisions for females than for males. It is thought that these cases, forming at least a twenty-fifth (probably more) of all mental cases in the community, and at least a fourth (perhaps somewhat more) of all not insane mental cases, might perhaps warrant, if combined with the convalescents, the establishment of a public sanatorium to be run on economical lines in the country.
- 7. It is largely the great expense (from \$20 to \$25 per week) of caring for these cases in a centrally placed psychopathic hospital or psychiatric clinic which determines the idea of a rural public sanatorium; for psychotherapy (in whatever form may be determined to be valuable), rest treatment, work treatment and calisthenics, to say nothing of dietary and other general measures, can be as well, though more expensively, carried out in the urban psychopathic hospital.
- 8. Of the 570 not insane discharges, 165 were not classified as showing any particular form of mental or other defect, although it must be emphasized that each of these came for psychodiagnostic reasons, and was admitted under a special form of law. One even was a case regularly committed under judicial procedure, but later determined to be not insane, and nine others came under judicial authority by virtue of certain other laws not commonly used.
- 9. Of these 165 not insane discharges, 90 had been admitted under the temporary-care law, unique in Massachusetts, referred to in paragraph 2 (except in fifteen instances in which a somewhat similar law, operating for the city of Boston alone, was employed). With respect to these persons it must be emphasized that their problems would not have been so easily solved under any other procedure. Examples of such problems are question of paraphrenia systematica, question of hysteria, question of defective delinquent, question of epilepsy, etc.
- 10. Of the 165 not insane discharges, 65 either resorted voluntarily to the hospital or were pursuaded to become voluntary

patients. It is evident that, in an increasing number of instances, persons realize or can be made to realize the possible psychopathic nature of their difficulties and come almost eagerly even to a public institution.

- 11. About 13 per cent (18 in 136) of these persons who were discharged as without active symptoms of mental or other disease yielded positive Wassermann reactions in their serums. The interpretation of this fact is doubtful. The percentage in the males was 10 (7 in 65), in females 16 (11 in 71).
- 12. Two-thirds of the patients aged six to fifteen were boys (21 boys, 10 girls), but of those aged sixteen to twenty-five, there were more than four times as many women as men (10 men, 45 women). From twenty-six to forty, the sexes are about evenly distributed (17 men, 19 women). Then males preponderate (28 men, 14 women). Thus, women may be thought to get into suspicious psychopathic circumstances which later resolve, much more often in the period of adolescence; males somewhat more often in late boyhood and in postadolescent years. Therein lodges a problem in prognosis which if settled would greatly aid the alienist, particularly, in making certain social decisions.
- 13. It is clear that the influences which are bringing the not insane to the Psychopathic Hospital in Boston are bringing them there at comparatively early ages, and often (especially the females) in adolescence. The community's interest in the question of feeble-mindedness and the social worker's often justifiable desire to institutionalize her wards are powerful factors in this resort for diagnosis to a State institution. The physicians in the community are almost to a man, I believe, pleased with the increasing facility with which, under the laws mentioned above, some of their most difficult problems are solved. when almost the only recourse in determining absolutely whether a patient was insane was to adjudge him insane and release him afterward if a mistake had been made. To overcome this difficulty, various devices have been adopted in the more highly civilized of our States. The Massachusetts arrangements are of particular interest to those who may not have been able as yet to civilize their own States in these directions.

Southard, E. E. Progress of the Psychopathic Hospital on the Prophylactic Side of Mental Hygiene. Being Contribution from the Psychopathic Hospital, Boston, Mass., No. 52 (1914.18). Boston Medical and Surgical Journal, Dec. 3, 1914, CLXXI, 847-850.

SUMMARY.

I will sum up briefly by saying that the prophylactic division of mental hygiene can safely claim to be far more than a letter-head or a propaganda, and that, whatever its legal and public institutional sides, the prophylactic division of mental hygiene has as concrete measures:—

- 1. The stimulation of proper temporary care of persons suffering from mental derangement under the conditions of general hospital and private practice.
- 2. The stimulation of voluntary admissions to existing and future hospitals for the insane.
- 3. The establishment of psychopathic hospitals in proper centers, having proper medical and social arrangements for the highest forms of intramural and extramural individual and community service. If you are tempted to state that the term "psychopathic" somewhat resembles that blessed name "Mesopotamia" in its drawing powers, as Mr. Frank B. Sanborn once insisted, yet I venture to hope that its extension to include both the legally insane and the great variety of other mental cases, including psychoneurotics, mentally deficients, and criminalistic and possibly other types of mental disorder, will tend to abolish the use of the term "insane" by physicians, except under court conditions. The term "insane" is rightfully considered a legal and not a medical term. One of the greatest features of a mental hygiene propaganda will be to convince and to persuade the world of this fact.

Southard, E. E., and Canavan, Myrtelle M. Normallooking Brains in Psychopathic Subjects: Second Note (Westborough State Hospital Material). Journal of Nervous and Mental Disease, New York, 1914, XLI, 775-782.

Conclusions.

1. The writers have tested former issues concerning the functionality of mental disease (derived from a comparison of Worcester autopsy material and that from Danvers) by a study of Westborough material in which neither a bias towards functionality nor a bias toward structurality ("organic nature") was likely.

- 2. The Worcester proportion of normal-looking brains in a series of psychopathic subjects was about 1 in 3, the Danvers proportion, about 1 in 4; the Westborough proportion proves to be about 1 in 7.
- 3. The Westborough standards tend to overthrow the idea of the essential functionality of various senile cases, an idea that was suggested both by the Danvers and the Worcester series of autopsies.
- 4. As to the moot question of dementia præcox, the Westborough results stand nearer the Danvers results, exhibiting a scant majority of gross-lesion cases as against the long, entirely negative series at Worcester, and the high percentages of gross lesion found at Danvers.
- 5. In a previous study use was made of a principle that extensive microscopic changes may be wholly consistent with a grossly normal brain appearance up to a period not yet accurately established (say three months). In point of fact, 11 per cent of the Worcester series (26 cases) and 16 per cent of the Westborough series (12 cases) had a total duration of symptoms of three months or less.
- 6. Practically, it is often a year or more before visible and tangible changes in the brain of an undoubted character set in, and 15 per cent of the Worcester series (36 cases) and 33 per cent of the Westborough series (24 cases) had durations of a year or less.
- 7. Perhaps it is too much to ask the anatomist at the autopsy table to diagnosticate the results of the finer diffuse destructive changes (non-globar, not affecting the projection system) which have lasted but a year or less.
- 8. Practically we look for recoveries up to three years, more or less; 53 per cent of the Worcester series (132 cases) and 58 per cent of the Westborough series (42) had lasted but three years or less. Such cases may well show (and many of them have shown, though it is not our design to describe them) microscopic changes of an important reversible or non-destructive character.
- 9. Research should accordingly be bent upon those long-standing cases which nevertheless show no gross effects of their disease in the brain. The microscope, may discover in this group

- either (a) evidences of reversible brain-cell changes such that they never produce any gross effects (physical or chemical changes not interfering with cell nuclei or other vegetative mechanisms), or (b) no evidences of morbid brain changes whatever, but merely such appearances as are consistent with the brain's reacting normally to influences ab extra.
- 10. These orientation studies show how seldom are all the conditions right for testing such an hypothesis as that of the intrinsic normality of brain mechanisms whose reactions are taking effect in extrinsic abnormality, i.e., the hypothesis that mental disease may be entirely functional so far as the brain is concerned.
- 11. Accordingly, we seem still father away from a strict proof that "the whole cortex, or even the whole nervous system, might be intrinsically normal but extrinsically abnormal in its reactions to a given chemical, physical or other condition."
- SOUTHARD, E. E., and BOND, E. D. Clinical and Anatomical Analysis of 11 Cases of Mental Disease arising in the Second Decade, with Special Reference to a Certain Type of Cortical Hyperpigmentation in Manic-depressive Insanity. (Danvers State Hospital Series No. 38.) (Proceedings, American Medico-Psychological Association, 1914, 223-235.

Conclusions.

- 1. This work is another instalment of work designed to throw light on the age factor in the production of mental disease, and has the same features of random selection, employing only autopsied cases, from a long series, as did previous work from the Danvers State Hospital Jaboratory on cases having onset in the sixth and seventh decades (1908) and in the fifth decade (1913).
- 2. There turned out to be surprisingly few cases for the analysis; somewhat less than 2 per cent of a long series of autopsied cases (18 in 938) proved to be cases having onset of mental disease between ten and twenty years.
- 3. The age distribution in the 11 cases which proved suitable for full clinical and anatomical correlations is striking; of these 11, 8 had onset between seventeen and twenty years, and 5 of these 8 at seventeen years; the age distribution, so far as it goes, suggests disorder at puberty as somehow related with the onset of the first attack.
- 4. Omitting one female epileptic which demented, we find the cases equally distributed between manic-depressive insanity and

dementia præcox. The manic-depressive 5 were composed of 4 females (1 of rather doubtful diagnosis) and 1 male. The dementia præcox 5 were composed of 3 females and 2 males. Four of the 5 dementia præcox cases were subject to tuberculosis; 1 of the manic-depressives was tuberculous.

- 5. The lipoid disorder, of which we attempted to get an index by a study of the distribution of certain substances stainable by the Heidenhain iron-hematoxylin method, was far more in evidence in the manic-depressive series than in the dementia præcox series.
- 6. The three cases with most marked pigmentation (in this specialized sense) were: (a) the epileptic dement above mentioned, onset at thirteen, attacks till death at fifty-nine; (b) a manic-depressive, depressed at seventeen, thirty-one and thirty-two, maniacal at forty-nine, dead of intercurrent disease at forty-nine; and (c) a manic-depressive, very numerous attacks of depression, first at eighteen to twenty, 7 known attacks between fifty-eight and death at sixty-eight. The other three manic-depressive cases showed marked (although less marked) pigmentation focally in (d), the doubtful case above mentioned (in which, indeed, the pigment is rather an index of local metabolic disorder in an inflamed convolution), and (e, f), cases dying at twenty-five and thirty-one, respectively.
- 7. The dementia præcox cases either showed no pigment, as in (g), death at seventeen after nine months of symptoms; (h), death at forty-five, after thirty years of symptoms; (i), death at thirty-two, twenty years after onset, or a slight amount, as in (j), death at twenty-nine after nine years of symptoms, and (k), death at twenty-two after five years of symptoms (pigment in occasional pyramids).
- 8. If these findings should be taken at their face value, it might be inferred that manic-depressive insanity is more likely to prove a disease involving brain-cell metabolism than is dementia præcox. In dementia præcox there is more evidence that certain cells have been destroyed outright; but cells which escape destruction are not likely to look in any respect abnormal. In manic-depressive insanity there is not such good evidence of cell destruction; on the other hand, these cases seem to show that overloading with a certain kind of pigment is more characteristic of the brain cells of manic-depressives than of precocious dements.
- 9. The manic-depressive cases of this series seem to have shown more depression than mania. What the relation of this may be

to the histology of these cases is doubtful, but it would seem desirable to examine cases of long-continued mania and long-continued depression with the same technique.

- 10. Previous work from this laboratory on age correlations with pigment deposits has suggested that especially the neuroglia cells are likely to show progressively more and more pigment with advancing age; the present work, regardless of the special entity correlations just discussed, seems to show that youthful cases do not show much neuroglia-cell pigment, and therefore this work is to that extent consistent with former results.
- 11. As to the possible causes of the pigment deposits in various types of cell, perhaps nothing better than the mystic term "metabolic" can be risked. Still, there are two cases in which there were decidedly local accumulations of somewhat similar-looking substances due to or closely associated with acute inflammatory processes (see Cases 1 and 10, dying at seventeen and twenty-two years, respectively). In these cases, to a large extent entirely free from pigmentation, either the pressure or the toxines of the inflammation had produced the same appearances focally that are shown by other non-inflammatory cases diffusely. The deposits are, then, possibly favored by certain factors working ab extra with respect to the cells in question.

SOUTHARD, E. E., and STEARNS, A. W. The Margin of Error in Psychopathic Hospital Diagnosis. Being Contribution from the Psychopathic Hospital, Boston, Mass., No. 61 (1914.27). Boston Medical and Surgical Journal, 1914, CLXXI, 895– 900; 1013.

SUMMARY.

The writers discuss the difference between insanity and mental disease. Studies of similar scope at Danvers (general paresis, senile dementia, psychoses in general) and at Worcester (general paresis) are mentioned, and a table is offered showing the high accuracy which the diagnosis of general paresis had obtained even before the Wassermann reaction was available. They remark upon the frequency of "unclassified" cases at Danvers Hospital, and show a similar frequency at the Psychopathic Hospital, Boston.

It is shown that about 1 in 5 cases gets no diagnosis at the Psychopathic, and that of those cases that do achieve a diagnosis 1 in 4 has its diagnosis altered upon removal to a State hospital. Not all of those removed receive a definite diagnosis. There is,

in fact, a residuum of about 6 per cent that have as yet remained unclassified.

Some analysis is made of the figures for five hospitals receiving the majority of the Psychopathic Hospital patients. Possible bias in diagnosis is considered, but largely discarded. The most difficult field of diagnosis is shown to be that of dementia præcox and manic-depressive psychosis. It is thought that the excited or agitated patients of these groups form the largest and best subject of diagnostic and theoretical investigation. Examples of interesting alterations of diagnosis are offered, including a case in which the terminal phase of an alcoholic hallucinosis, together with incoherence (perhaps due to attention-disorder) and maniacal symptoms, was the basis of a diagnosis of dementia præcox, whereas the true diagnosis was very probably manic-depressive psychosis combined with alcoholic psychosis.

Southard, E. E. Applications of the Pragmatic Method to Psychiatry. Journal of Laboratory and Clinical Medicine, St. Louis, 1919, V, 139-145.

SUMMARY.

- 1. Psychiatry should more and more adopt the "Laboratory habit of mind," become more and more pragmatic, and bring itself in line with the rest of medicine.
- 2. Seven applications of the pragmatic method to psychiatry are offered:—
- (a) It makes a difference to the patient whether he is seen by a psychiatrist or by a clinical neurologist. There is thus for the moment a real difference between psychiatry and clinical neurology, though the future may destroy that difference and produce "neuropsychiatry."
- (b) It makes a difference to the patient whether we take "insanity" as a unit or as a collection of entities. The pragmatic rule decides in favor of a pluralistic view of mental diseases.
- (¿) The principle of orderly exclusion in the diagnosis of complicated cases is of pragmatic value.
- (d) Especially is this true of the diagnostic field of neuro-syphilis, where it is important to maintain the *non*-paretic hypothesis as long as possible in the interest of the patient's therapy.
- (e) Opinions might differ as to the advisability of entertaining the hypothesis of focal brain disease before or after the hypothesis of somatic (non-neural) disease in a given case. The

pragmatic rule might decide one way for general hospital clinics and the other way for mental clinics.

- (f) Schizophrenia should be eliminated before cyclothymia on the pragmatic basis, for a group of schizophrenic symptoms is much more decisive for dementia præcox than a group of cyclothymic symptoms is decisive for manic-depressive psychosis.
- (g) The pragmatic method decides that in the face of complete ignorance of its true nature, involution-melancholia is better placed in the cyclothymic (manic-depressive) group than in the senile-senescent group, if it is to be placed in either group.
- Southard, E. E. Anatomical Findings in the Brains of Manicdepressive Subjects. This paper is No. 99 (1915.2), Contributions of the Massachusetts Board of Insanity, and No. 54, Danvers State Hospital Contributions. Some of the conclusions were presented at the meeting of the New England Society of Psychiatry at Rutland, Mass., in September, 1909. An abstract was presented at the seventieth annual meeting of the American Medico-Psychological Association at Baltimore, May 26–29, 1914. Proceedings, American Medico-Psychological Association, Baltimore, 1914, XXI, 237–274.

Conclusions.

- 1. Kraepelin states that the anatomy of manic-depressive subjects is negative. Various authors have described focal lesions with which to account for the occasional dementia which textbooks mention. Evidence as to the existence of brain stigmata is equivocal. Orton has recently found satellitosis perhaps rather more in manic-depressive than in dementia-præcox subjects.
- 2. The fundamental and even practically important question of brain-anatomy in manic-depressive subjects has been here taken up precisely with the same ideas and with similar material as in the writer's first study of dementia-præcox brains, namely, with the topographic idea far more prominent than it has been made by most workers in the field of what used to be called "functional psychoses."
- 3. The first question which occurs to a critic of my 86 per cent of anomalies, scleroses and atrophies in dementia præcox is: What percentage of similar conditions would "not-insane" subjects show, and what would be shown in the disease manic-depressive insanity? The present paper deals with the latter inquiry and throws indirect light upon the former.

- 4. As ever, much depends upon what one terms manic-depressive psychosis. In the text I have given relatively full accounts of most cases excluded from my initial list, which comprised every case which had received the diagnosis (at times on decidedly insufficient grounds) in a certain period at Danvers Hospital. Many of my exclusions tend to swell the dementia-præcox group, and these cases may be studied with my dementia-præcox material of 1910. To avoid confusion I have excluded cases of involution-melancholia.
- 5. As against my 86 per cent lesions in dementia præcox, I regard 13 per cent as a fair percentage for manic-depressive insanity (4 in 31). A little less rigorous clinical analysis would leave the percentage at 18 per cent (6 focal-lesion cases in 33). In a total random material (after certain obvious exclusions) of 38 cases, it would not be possible, I believe, for the most ardent anatomist to find more than 11 cases of focal lesions (29 per cent). But this last percentage is assuredly too high, since three cases in the group are pretty clearly cases of dementia præcox. Thus 8 in 35 (23 per cent) is a figure which some analysts might prefer, though personally I believe it too high.
- 6. Roughly speaking, then, we may think of the manic-depressive group as exhibiting brain stigmata or focal lesions (not arteriosclerotic) in about 1 brain in every 5, whereas dementia-pracox brains show such conditions in about 4 out of every 5 brains.
- 7. This finding must be of some significance, whatever the criteria, and whatever particular functional correlations one might infer. The finding does not prove or indicate that the manic-depressive brain is normal, but it does show that the cellular lesions, if any are to be found, must be of a peculiar and probably a reversible nature. And, whereas eager histological researches in the brain are much to the point, perhaps the canny observer will regard the non-nervous organs of the body, or those supplied by the autonomic system, as even more inviting to study in the manic-depressive group.
- 8. No special histological study is here presented, although some orienting slides have been available in the great majority of cases, from which Orton's conclusions about satellitosis can be in a measure confirmed. Indications of a special line of attack have been presented by Bond in a paper with the writer, and some conclusions bearing on this point have been drawn in the writer's thalamus paper.
 - 9. A study of the literature yielded a few special questions

which I have endeavored to answer, largely on the basis of the material without focal lesions, since I regard these four-fifths of my material as far less open to diagnostic suspicion than the one-fifth possessing lesions.

- 10. The question of the relation of certain instances of eventual dementia to arteriosclerotic brain lesions is provisionally answered in the negative; but the question requires further study.
- 11. Heredity does not show itself in most manic-depressives in the form of brain stigmata; but the extremely high index of insane heredity in near relatives is remarkable. I am inclined provisionally to regard manic-depressive insanity as constantly or almost constantly hereditary, not in the sense of similar heredity (this has not been adequately studied), but in the sense that some kind of insanity is almost always, if not always, to be found in near relatives. Without such evidence, I am clinically not now disposed to make the diagnosis "manic-depressive," although it is clear that the rule will not work in the other direction. For the moment I am challenging my records to produce an unexceptionable case of manic-depressive psychosis which does not show family taint of insanity.
- 12. Upon these provisional hypotheses are we to assume that the normal-looking brains of manic-depressives are really normal, i.e., intrinsically, and merely purveying the impulses which a sick body is producing? Or shall we assume a chemical or physicochemical instability of the entire nervous system, such that, although the brain is intrinsically abnormal, the abnormality does not show as yet? Hereditary taint is consistent enough with either assumption, since the germ-plasm might with equal readiness mark the nervous and the non-nervous parts of the body with those invisible marks that produce "functional psychoses."
- Southard, E. E. On the Direction of Research as to the Analysis of Cortical Stigmata and Focal Lesions in Certain Psychoses. Being Contribution of the State Board of Insanity, No. 42 (1915.8). Transactions, Association of American Physicians, Philadelphia, 1914, XXIX, 651-673.

SUMMARY AND CONCLUSIONS.

In the above communication I have endeavored to bring out what I regard as an important line of structural research in mental disease. The general point of view on which I stand may be regarded as somatic, although the topic which is most

important for psychiatry is undoubtedly the functional psychoses (especially dementia præcox and manic-depressive psychosis). In dementia præcox I find four-fifths of the cases showing at autopsy certain appearances which may be regarded as anomalies or lesions in some sense. Possibly they should be regarded as weak places in the brain structure in which there may be later every evidence of progressive disease. The percentage of cases of dementia præcox showing these lesions is 80 per cent or higher. The percentage in the brains of non-psychopathic subjects has never been properly established, but in the so-called functional mental disease, manic-depressive psychosis, I find similar anomalies or lesions in about 20 per cent of all cases.

Accordingly, I hold that dementia præcox is a disease in which cortical stigmata are much more often found than in certain other forms of mental disease, and probably decidedly more often than in the normal citizens of the world.

The direction which research should take as to these findings is important. My point of view here is again a structural one. I present some photographs from two cases which indicate what I think will prove a rich line of research. There are two main lines of consideration.

First. — We may study the appearances in those tissues which are regarded as the sensory arrival-platforms of the cerebral-cortex (for example, the calcarine type of occipital cortex) and contrast the findings in the sensory arrival-platforms with findings in the elaborative tissues which are adjacent thereto (for example, the common occipital type of cortex in the occipital region just mentioned). It is currently thought that we can safely call the calcarine type the visuo-sensory type, and the common occipital type the visuo-psychic part of the cerebral-cortex. When we are able to get under the same cover-glass materials fixed, prepared and stained in the identical manner and observable in the same thickness, we are undoubtedly able to attach much consequence to the results of microscopic examination.

Second. — We are able in certain cases to use the bilaterality of structures in the brain to help us in our interpretations. I present photographs in another case which illustrate the line which research may well take. One post-central gyrus in this case was about half the thickness of the other.

The interpretation of the cell richness, the possible cell losses and the nature and degree of neuroglia cell reaction is not as easy as might appear at first sight. Particularly important is the question of the form of neuroglia cell proliferation which is variously termed neuronophagia and satellitosis.

In the present argument I point out that the visuo-psychic tissues of a certain case showed satellitosis, whereas the immediate adjacent visuo-sensory tissues failed to do so. On the other hand, I find that the narrow and apparently decidedly anomalous postcentral gyrus of another case fails to show satellitosis, but that its fellow on the other side, showing no gross lesion, shows frank evidences of satellitosis when examined microscopically. The point, perhaps, is that the narrow gyrus has completed its pathological evolution and has passed the phase of satellitosis; but our results here must remain problematical until we know more as to the intimate nature of satellitosis.

My total argument for a certain optimism in structural research in psychiatry is accordingly founded, not upon the interesting clinical correlations of the two cases (A, striking scenic visual hallucinosis, satellitosis of common occipital cortex, B, catatonic phenomena and anomalies of the postcentral gyri), but rather upon the more general consideration that we now have, owing to the efforts of the modern cortex topographers, the basis for differential histopathological analysis of adjacent cortical tissues of different functional significance, and the benefit of examining tissues of co-ordinate nature on the two sides. careful attention of the histopathologist in the nervous system should accordingly be given to all those planes in which arrivalplatform tissue comes into contact with higher elaborative tissues in the sense of the modern cortex topographers; and the findings in any gyrus should be controlled by study of the corresponding gyrus of the other hemisphere.

Southard, E. E., and Canavan, Myrtelle M. On the Nature and Importance of Kidney Lesions in Psychopathic Subjects: A Study of 100 Cases autopsied at the Boston State Hospital. Being Contribution of the State Board of Insanity, No. 23 (1914.3). Journal of Medical Research, Boston, 1914-15, XXXI, 285-299. (New series, Vol. XXVI).

Conclusions.

1. These general results substantiate those of a more superficial inquiry in a larger number of cases (see introductory note) as well as those of the late W. L. Worcester on the same kind of material (1899).

- 2. The inquiry here reported deals with a more systematic histological examination of kidneys in the insane than has been reported for many years, embodying a tabulation of findings in the gross and microscopically in the different recognizable structures of the kidney.
- 3. The analysis permits saying that normal kidneys must be of the greatest rarity in the insane at autopsy, for in the present series of 100 no instance of normal kidneys was found.
- 4. It is less possible to say that these renal conditions were of moment to the individuals who bore them, since some of the lesions are very possibly extinct, and others cannot safely be interpreted in the present state of pathology.
- 5. Their interest from the therapeutic and dietetic standpoint is considerable, since there were at least 39 instances of acute renal disease, and 11 of these complicated by a background of chronic lesions.
- 6. Aside from these 39 acute (or acute and chronic) conditions, there were 55 instances of chronic lesions (or 66, if we include the 11 cases with both acute and chronic lesions).
- 7. There were in point of fact but 5 cases in which the kidneys were regarded as normal to the naked eye.
- 8. Clinically, among 65 cases examined, albuminuria was found in 25 (or 38 per cent), and cylindruria in 18 (or 28 per cent). Also the specific gravity went below 1015 at times in 18 cases (or 28 per cent). No special statistical significance need be attached to these latter figures.
- 9. Clinically, also, there were 10 instances of œdema, probably either caused or favored by the renal condition (4 of these 10 cases showed cardiac disease also).
- 10. Clinical records show 19 instances of seizures or convulsions of some sort, but it is not clear how many of these can be regarded as renal.
- 11. Clinical records also indicate that 23 of the 100 cases were regarded in life as more or less severe cardiac cases.
- 12. Of the females examined, 26 (or 52 per cent) had borne one or more children.
 - 13. Thirty-two of the 100 cases were emaciated at death.
- 14. The most prominent gross lesion in the series was chronic interstitial nephritis, which occurred in 42 cases.
- 15. Microscopically, chronic interstitial nephritis was found not only in these 42 cases, but also in 24 other cases (a total percentage of 66).

- 16. There were 33 cases in which chronic interstitial nephritis was not only marked in the gross, but was the only significant kidney finding microscopically also.
- 17. Microscopically, much attention was paid to the occurrence and distribution of plasma cells in the kidney substance, since these might well be regarded as indicating a more active (or less extinct) sort of lesion than simple fibrosis.
- 18. Plasma cells were never found in such quantity as to suggest acute interstitial nephritis, but plasma cells were found in 42 per cent of the series.
- 19. Thirty-eight of these 42 plasma cell cases showed the plasma cells distributed chiefly about the glomeruli. This distribution naturally suggests special conditions (toxic?) in the periglomerular region, and in point of fact there was very frequently a glomerular lesion associated with this exudation.
- 20. A broader or different distribution of plasma cells was far less common, and the small groups of such unusual distribution are presented in the text.
- 21. Eleven cases out of 26 under fifty years of age yielded plasma cells, i.e., exactly the same percentage as did the total series.
- 22. The occurrence of plasma cells in the kidneys of general paretics is worthy of note by reason of their constant occurrence in the brains. Seventeen of 30 paretics in this series showed plasma cells in the kidney, or 56 per cent. It is possible that they are of focal occurrence in the kidney (though nothing specially to indicate this was found), and that more systematic work would swell the percentage. Sixteen of the 17 paretics showed the plasma cells in the periglomerular region, while 1 showed them in a subcapsular zone.
- 23. Seven of the whole series of 30 paretics had seizures; 5 of these seizure cases showed periglomerular plasma cells, 1 showed no chronic lesion except general fibrosis, and 1 was a case of acute parenchymatous nephritis without chronic lesion (12.13). But 3 of these 7 cases showed casts, and these only in one tubule type (descending loop of Henle).
- 24. Curiously enough, 12 other non-paretic cases which had seizures or convulsions of various sorts failed to show plasma cells in the kidneys, but in 8 instances did show casts, although always confined to a single tubule type (six times in the tubule type of election, the descending loop of Henle).
 - 25. Seventy-three cases showed casts in one or more types of

tubule; 50 cases in one type of tubule only (40, descending loop of Henle); 14 in two tubule types; 7 in three tubule types; and 2 in four tubule types.

- 26. Sixty-three of the 73 cast-bearing cases showed the casts in the descending loop of Henle, which seems entitled by consequence to be called the tubule of election for cast deposit or retention.
- 27. There was a curious time distribution of those cases which showed casts in the less common locus of the proximal convoluted tubule. Ten of these 12 cases died within a period of four months, November to February, 1912–13. One may suspect special dietary or bacterial conditions for this fact.
- 28. Glomerular tuft changes of a serious nature occurred in 51 cases, and there were indications of disease in 13 others (besides two acute lesions). Changes in the glomerular capsule were far less in number, being of a serious nature in but 17 cases (slight or infrequent in 10 others). Cast deposits occurred in 8 cases under fifty years of age without evidence of glomerular change.
- 29. Some facts are noted concerning the possible relations of acute renal lesions to infective foci in the urinary apparatus or in the body at large.
- 30. The study seems to show a significantly high proportion of chronic and acute lesions of the kidney in psychopathic subjects; such conditions should engage the attention of dietitians in insane hospitals.

Canavan, Myrtelle M., and Southard, E. E. The Significance of Bacteria cultivated from the Human Cadaver: A Second Series of 100 Cases of Mental Disease, with Blood and Cerebrospinal Fluid Cultures and Clinical and Histological Correlations. Being Contribution of the State Board of Insanity No. 24 (1914.4). Journal of Medical Research, Boston, 1914–15, XXXI, 339–365.

(New series, Vol. XXVI.)

SUMMARY AND CONCLUSIONS.

(Note. — The conclusions have been numbered to correspond with the conclusions of Gay and Southard, 1910.)

1. In a study similar in scope to that of Gay and Southard, 1910, the writers present the results of a second series of 100 bacterial cultivations from the heart's blood and the cerebro-

spinal fluid post mortem in cases of mental disease. The new series is from the Boston, instead of the Danvers, State Hospital.

- 2. The bacteria were cultivated upon agar plates inoculated with 1.5 cubic centimeters heart's blood, and others with 1.5 cubic centimeters cerebrospinal fluid. The cerebrospinal fluid was removed from the third ventricle through the infundibulum, severed at its origin.
- 3. Forty-four per cent of the blood cultures remained sterile (Gradwohl, 22 per cent; Gay and Southard, 41 per cent; Otten, 42 per cent; Simmonds, 48 per cent).
- 4. Twenty-four per cent of the cerebrospinal fluid cultures remained sterile (Tomlinson, 28 per cent; Gay and Southard, 28 per cent).
- 5. Under somewhat different laboratory conditions the Boston laboratory (bodies often not ice-cooled and always held at a somewhat higher temperature than at Danvers) thus paradoxically yields more steriles than the Danvers laboratory in the blood (44:41), but less in the cerebrospinal fluid (24:28).
- 6. It is interesting, however, that the Boston series shows fewer cerebrospinal positives in the earlier than in the later periods post mortem, a tendency quite the reverse to that of the Danvers series, where the icing (often freezing) of the cadavers may well have inhibited the growth of bacteria post mortem.
- 7. On the other hand, the heart's blood results are not readily interpretable on the above or any other basis, unless we invoke special bactericidal properties in the sera of different cases.
- 8. With the lapse of time post mortem, accordingly, the cerebrospinal fluid certainly seems to show the effect of its non-bacteriolytic properties (see conclusions 7-9 of Gay and Southard's article quoted above), at a comparatively early date, in the increased frequency of its positives when temperature permits (Boston) as against no increased frequency (or reduction?) when temperature is unfavorable (Danvers).
- 9. The heart's blood with its (for some time) persistent bacteriolytic substances does not seem to show notable variation in its incidence of positives as time post mortem elapses under either Boston or Danvers conditions.
- 10. As to particular bacterial forms, cocci prevail in both series, and in both series there were more cultivations of cocci from the cerebrospinal fluid than from the blood.
- 11. At Danvers no diphtheroid organisms were picked up in bodies of paretics (pace Ford Robertson, 1906); at Boston there

was one such instance from the blood and fluid of a case. This as well as other considerations concerning secondary invasions in general paresis will be taken up in a separate communication.

- 12. Cultivations from twenty-six general paretics are listed; cocci no longer especially prevail in the positive cases (contra Danvers).
- 13. No conclusion as to the possible relation of bacterial invaders to fatty changes can be drawn from the sterile cases, since all the cases but one were too old to be free from the suspicion of age-changes in the production of lipoid alterations; there was, however, one case, twenty-three years of age, probably quite sterile throughout, and this case showed no lipoid alterations in any part studied.
- 14. On the other hand, there were twenty cases in which no fatty changes were found histologically, and of these no case showed Bacillus coli communis, and cocci prevail as in the Danvers series. Thus, whether we assume various lipoid alterations to go on ante mortem or post mortem, and under the influence of bacteria or not under such influence, it would appear that cocci can hardly be charged with effecting such lipoid changes.
- 15. Forty-six cases are listed, having had symptoms less than four days in duration, as against 31 in the Danvers series; 18 per cent of the new series, examined by fat-staining methods, proved negative as against 29 per cent histologically negative in the Danvers series; and the 18 per cent thus both clinically and histologically negative in the Boston series contrast with 14 per cent histologically negative in the total Boston series, a variation in the same direction as in the Danvers series (29 per cent: 10 per cent), only less striking.
- 16. In 8 cases chosen as showing most marked fatty changes there were no instances of colibacillosis (one case only of anaërogenes bacillemia); in fact, 5 cases were negative in the cerebrospinal fluid, and 6 negative in blood.
- 17. One of the highly (Marchi) degenerated cases (among the 8 just mentioned) yielded Cladothrix invulnerabilis in the cerebrospinal fluid; a second case with the same finding also showed degeneration, though of less marked degree; two of the highly degenerated cases (of the 8 supra) yielded Bacillus murisepticus; another case showed degenerations, but less marked.
- 18. There were 9 cases of generalized softening of brain tissues in the Boston series as opposed to 13 in the Danvers series; more-

over, three of these Boston cases were autopsied from three to eight and one-half days post mortem (at a time when ferment action may be presumed to be under way). No case showed Bacillus coli communis; the bacteria found were in two instances reputed pathogens (Bacterium varicosum and Micrococcus salivarius). In three other cases the organisms were either liquefiers of various media (Bacillus subtilis, Micrococcus alvi) or abstractors of water (Cladothrix invulnerabilis). In only one case was the bacteriology negative (a case of ulcerative colitis).

19. Only indirect evidence concerning the effect of Bacillus coli communis or its toxines on nerve fiber degeneration is here afforded; however, the organisms which are associated with the soft brains in the Boston series are in most cases also liquefiers of various laboratory media.

Epicritical Conclusions. — The conclusions of the new study in general coincide with those of Gay and Southard, but present some novel points (especially conclusions 6, 8, 14, 16, 18), and these points may be briefly considered as follows: —

- 20. It is suggested by a comparison of the two series that the more immediate and thorough cooling (or even icing) of the Danvers cadavers has served to inhibit the growth of bacteria in the cerebrospinal fluid, since the lapse of time post mortem is attended in the Boston series by increasing frequency of positives in the cerebrospinal fluid.
- 21. The blood findings show no such effects as those just mentioned for the cerebrospinal fluid; perhaps the curve is spoiled by the presence or absence in special cases of bactericidal substances in the blood.
- 22. Whatever may be said of the possible ante-mortem or post-mortem effects of other organisms in producing lipoid changes in the nervous system, the cocci as a group may be absolved from this charge; if the cocci act at all ante mortem, it must be rather in the direction of irritative than of destructive effects.
- 23. The absence of colibacillosis in the Boston series is striking; a few other organisms, either pathogenic or somewhat destructive to the laboratory media used for their cultivation, enter to take the place of Bacillus coli communis in the "soft brain" cases.

1915.

SOUTHARD, E. E., and CANAVAN, MYRTELLE M. A Study of Normal-looking Brains in Psychopathic Subjects: Third Note (Boston State Hospital). Being Contribution of the State Board of Insanity, No. 35 (1915.1). Boston Medical and Surgical Journal, 1915, CLXXII, 124-131.

Conclusions.

- 1. The present is a fragment from more extensive studies tending to settle the question how far mental disease is consistent with normality of brain; and as in previous work from the Worcester State Hospital, so this work from the Boston State Hospital has chosen to begin with normal-looking brains, since these are more likely to be essentially normal than those brains which yield obvious lesions.
- 2. On comparison with the Worcester percentage of normal-looking brains, viz., about 1 in 3, and the Danvers percentage, viz., about 1 in 4, the present Boston percentage is much lower, viz., about 1 in 8.
- 3. We do not deny that some of the lesions found in the abnormal brains may have had little or nothing to do with the mental disease which their bearers showed; the point of our research lodges in the endeavor to discover essentially normal brains in subjects of mental disease. There are 20 in 153 examined by uniform methods which gave promise of being microscopically as well as macroscopically normal.
- 4. One normal-looking brain yielded a chronic-looking exudate, Case I (12.55) which was a case of general paresis of brief duration (less than five months), clinically certain, showed nerve cell and fibre changes, gliosis and perivascular mononucleosis (including plasma cells) of fairly even degree throughout sections examined. The gross examination yielded opaque points of thickening in the pia mater over the vertex. The dura had begun to thicken and the calvarial diploe had begun to disappear. The brain had not lost more than 100 grams in weight (Tigges' formula).
- 5. One case yielded evidences of acute perivascular exudate post-pneumonic encephalitis, but the mental picture cannot be regarded as due to the exudate.
- 6. The suspicion is often uttered that cases not infrequently show fine vascular disease not evident in the gross. No such

case has appeared, but there was one (X, 11.42) which, despite coarse changes in the basal vessels, was included in the normallooking series and microscopically showed slightly marked fine vascular changes with equally marked cortical changes (no infarcts, but generalized and focal losses). This case was a female of eighty whose brain weighed 1,125 grams, i.e., 5 grams above the calculated weight according to body length. It is possible that the brain was slightly edematous — vacuoles among nerve cells (eighteen hours post mortem, tuberculous peritonitis). brain was included in the normal-looking series, although on the autopsy table the diagnosis of "general cerebral gliosis" was made (confirmed by the excess of cells in the plexiform layer in virtually every region examined). It may be inquired why a case with basal vascular disease should not be forthwith excluded on the ground that fine changes will be certain to be found; but they are not sure to be found, as XIV, 12.11, proved (since in this case there were gross arterial changes and few or no fine vascular changes).

- 7. We have accordingly reduced our 20 normal-looking cases to 18, which still give some promise of proving normal on microscopic examination. One of these 18 was a case of epilepsy, V, 11.26, with dementia; and since the epilepsy began in infancy, it is doubtful whether it should be included in this study. Microscopically, in any event, there were numerous evidences of cell losses.
- 8. If we exclude this case of epilepsy from the normal-looking numerator of the fraction, we should also possibly exclude 5 other epileptics (or in all 6) from the denominator, yielding a percentage of 11.5, i.e., 17 in 147 cases, excluding all epileptics and two cases, I and X, in which the microscope revealed changes which should theoretically yield gross lesions.
- 9. In a study of the percentage of normal-looking brains it would be wise, also, to exclude clear cases of imbecility, of which there were 2 in the series, neither of which yielded a normal-looking brain; this makes a percentage of 11.7 per cent normal-looking brains in a series of 145.
- 10. In the analysis of this residue of 17 normal-looking brain cases we must first consider the question of atrophy or aplasia. Eleven cases yielded brain weights above normal, employing Tigges' formula (i.e., $8 \times \text{body length}$ in cm. = probable brain weight). Six remaining brains weighed less than normal according to this formula. Of these 6, one (Case IV, 11.11) yielded a brain weight of 1,010 grams, calculated weight, 1,208 grams,

which should probably make this case fall into the atrophic brain group. The reflex picture and certain other clinical features gave rise to the diagnosis taboparesis. The total duration was but one month and four days. The absent knee jerks proved due either to axonal anterior horn cell reactions or to peripheral neuritis (abundant Marchi degenerations), and it is probable that we are dealing with a Korsakoff's psychosis (history of previous attacks of alcoholic mental disease not obtained, but possible). Abundant evidence of cell loss with satellitosis was found in many areas microscopically.

- 11. Another case (XV, 12.29) yielded a brain weighing 1,050 grams, i.e., a calculated loss of 150 grams. This case showed various evidences of atrophy in other organs also, and microscopically a remarkably diffuse cell loss in the cortex. Clinically the case was one of involution-melancholia, fifty-nine years of age, of twenty months and fourteen days.
- 12. Case XIII, 11.5, with a calculated brain weight loss of 120 grams, was a female of seventy-three years, with total duration of about eight years. The microscopic evidences of cell loss were such that this case also must probably be placed in the atrophic group; in point of fact, her brain atrophy was probably obscured by increase of weight eight and one-half days post mortem (brain not palpably soft on account of gliosis).
- 13. Case XIX, 10.9, with a calculated brain weight loss of 100 grams, showed a small heart (145 grams) and a small liver (1,000 grams). This case probably does not belong in the atrophic group, since microscopically there was small evidence of cell loss. This case of paranoid dementia præcox will be considered below. Case XVI, 11.36, and Case XII, 13.41, with calculated brain weight losses of 76 and 54 grams, respectively, can also hardly be classed as showing important degrees of brain atrophy (see below).
- 14. One case (VII, 11.31) must be excluded from the present analysis, because total brain sections are in process of making (case of syringomyelia).
- 15. There remains a group of 12 cases, excluding I, XIV, V from the original 19, i.e., I as general paretic, XIV as arteriosclerotic dement, V as epileptic, IV, XV and XIII as having atrophic brains, VI as syringomyelia (analysis unfinished). We accordingly remain with 1 normal-looking brain in 12.
- 16. The residue of normal-looking brains, with the above 8 omissions, consists of the following 12:—

Case.		Sex.	Age.	Onset.	Duration.	Diagnosis.
II (13.44) .		F.	44	44	1½ mos.	Central neuritis.
III (13.6) .		M.	44	43	2½ mos.	General paresis? Korsakoff.
VIII (12.37)		F.	71	71	8 mos.	Senile psychosis.
IX (13.16) .		M.	77	75	22 mos.	Senile psychosis; cerebral arte-
XI (12.7) .		M.	43	42	3 mos.	riosclerosis. Exhaustion psychosis.
XII (13.41) .		F.	60	50	102/3 yrs.	Unclassified (paranoia).
XIV (12.11)		M.	84	67	14 yrs.	Involution-melancholia.
XVI (11.36)		F.	30	29	20 mos.	Manic-depressive psychosis.
XVII (13.29)		F.	53	41	13½ yrs.	Manic-depressive psychosis.
XVIII (13.7)	. 1	F.	64	20	$2 \div 1\frac{1}{2}$ yrs.	Unclassified manic depressive.
XIX (10.9) .		F.	56	42	14 yrs.	Paranoia or dementia præcox.
XX (12.47) .		F.	27	25	28 yrs.	Dementia præcox (catatonia).

17. Attention is first directed to four cases of mental disease over ten years in duration; these are XIX, XIV, XII and XVII.

18. This group of cases in which gross registration of lesions might have been expected was subjected to orienting microscopic examination:—

Case XIX, 10.9, shows strikingly few evidences of cell loss, but careful search discovered foci of cell loss in the right second temporal gyrus. This case, though of slow evolution and diagnosticated paranoia, is thought to have had hallucinations of hearing as well as of sight. The delusions were largely of jealousy and otherwise sexual. One attack of so-called "cerebral congestion" at forty.

Case XIV, 12.11, involution-melancholia, eighty-four years at death, exhibited considerable cell loss in outer layers without marked satellitosis. Marked cell loss in calcarine region.

Case XII, 13.41, unclassified paranoic case, died at sixty, showed fairly numerous cell losses.

Case XVII, 13.29, manic-depressive psychosis, died at fifty-three, showed numerous cell losses, especially in upper layers.

19. According to a principle mentioned in the Worcester analysis, it would be unlikely that induration should register itself in brains undergoing gliosis in less than three months. There were three cases (II, III, XI) of which II was the case of possible central neuritis with marked acute cell changes ample to explain roughly the brief mental disease; III showed numerous acute cell

changes, probably quite consistent with the mental picture (Korsakoff's psychosis); and XI showed cell losses, perhaps of long standing (although there were overt symptoms for three months only), together with acute cell changes.

- 20. The group of intermediate duration, three months to three years, comprises 5 cases, XVI, VIII, XX, XVIII, IX. Of these, VIII, aged seventy-one, and IX, aged seventy-seven, attract attention on the score of age. Both showed cell losses: in the former, focal with perivascular gliosis; in the latter, marked diffuse losses. Of the three remaining, two are manic-depressive cases (XVI, 11.36, and XVIII, 13.7), and one (XX), catatonic dementia præcox. All three showed moderate degrees of cell loss.
- 21. Accordingly, it is plain that the search for functional psychoses which shall be above all neuropathological reproach is an exceedingly elusive task, and possibly never to be rewarded. In a forthcoming communication we shall deal with the detailed microscopic picture in five of the cases of this series (XII, XVI, XVIII, XIX, XX), since these five appear to be the least likely of all our series of 153 cases to show important microscopic lesions.

SOUTHARD, E. E. Some Relations of Mania to the Sensorium. (Abstract.) Psychological Bulletin, Lancaster, Pa., and Princeton, N. J., 1915, XII, 73.

REMARKS.

Mania, as conceived by modern workers, tends always to entail what Wernicke has called hyperkinesis. It might be natural to seek for the sources of hyperkinesis in the kinetic brain mechanisms. In point of fact, however, various better-known conditions of hyperkinesis, such as epilepsy and chorea, are often found related with lesions in various parts of the sensorium, and may even require a certain integrity of the kinetic apparatus. A brief review is given of the writer's work, showing the relations of hyperkinetic symptoms to certain lesions of the optic thalamus. New work is adduced concerning the association of mania with irritative lesions of the hinder part of the cerebral cortex (sensorium). Some other arguments are presented for the sensorial origin of hyperkinetic symptoms, and for the peculiar value of the intaking nervous mechanisms for the so-called behavior-psychology.

Southard, E. E., and Canavan, Myrtelle M. Notes on the Relations of Somatic (Non-Neural) Neoplasms to Mental Disease. (From the Psychopathic Hospital Laboratory of the State Board of Insanity (1915.11.)) Interstate Medical Journal, St. Louis, 1915, XXII, 738-751.

SUMMARY AND CONCLUSIONS.

The writers present a sketchy review of the present relations of tumor research to psychiatry, pointing out the special value of teratological conclusions and brain tumor work to psychiatry. The writers wish all brain tumor cases carefully examined by psychiatrists to be published for the purpose of corroborating or modifying the conclusions of Schuster as to correlations between tumors in various brain parts and mental symptoms. Reference is made to recent work on symptomatic psychoses and to various other pieces of work showing the close relation of oncology to psychiatry as found in the volumes of Zeitschrift fur Krebsforschung.

The writers believe that less than 3 per cent of routine autopsy material of State hospitals for the insane will show tumors of the brain. The figures for non-neural tumors stand at 3.9 per cent; allowing for errors and omissions of diagnosis, 4 per cent may be given as a roughly approximate index of the number of non-neural tumors in insane hospital autopsies. It is clear, accordingly, that brain tumors are of some importance in the causation or liberation of mental symptoms. Special lists are made of 20 gastric carcinomata, 6 intestinal, 10 uterine and 6 mammary occurring in the Boston and Danvers series. A study of mental symptoms displayed by cases possessing or developing non-neural neoplasms has been made, from which it is clear that certain symptoms stand higher and lower than they do in mental diseases at large. For example, incoherence stands high in these cases, emphasizing the frequency of delirium in the group. Depression, on the other hand, which has frequently been stated to be a major symptom in cases of intestinal disease, stands low in the cancer list, although it stands exceedingly high in a list of symptoms derived from 17,000 living and dead cases (Danvers State Hospital). The symptom sicchasia (refusal of food), comparatively low in the 17,000 miscellaneous cases, stands out prominently in carcinoma cases. Insomnia is surprisingly low in the psychopathic cancer group. Pain is not at all frequent in these cases. Cancer cases seem to have shown a marked exhibition of delusions with respect to food and with respect to members of the family. The ideational reactions to the world of these cancer cases are, on the whole, of an unpleasant nature, despite the comparative infrequency of depression.

The writers present 7 cases in which it might be thought that the cancers had close relation to the development of mental symptoms. Two of these are from the Psychopathic Hospital, Boston, one of which (Case VI) is most suggestive; but even in Case VI there were brain lesions of an acute nature, which may have complicated the picture. The second Psychopathic Hospital case (Case VII) was one in which the pancreatic carcinoma with its metastases may perhaps decidedly have influenced the symptoms in the fatal attack, but the case can be demonstrated to have been decidedly psychotic at the outset.

The remaining 5 cases (Cases I to V) are from the Danvers and Boston series. The correlations in Case I are fairly close in point of time and in simultaneous occurrence of physical signs of gastric cancer. The correlations in Case II are somewhat suggestive, and the hypochondriacal delusions ("stomach full") are striking. Two cases of esophageal carcinoma appear to illustrate the general tendency of carcinoma, or infection derived therefrom, to produce delirium or phenomena of the "exhaustion" group of the psychiatrists. Case V was a case of toxic delirium, apparently somewhat closely related to developments in a sarcoma of the jaw. The correlation is very possibly between infection from ulcer and mental symptoms.

Out of 68 cases of non-neural tumor found in the Boston and Danvers series, some 16 might be thought to show possible oncogenesis of the mental symptoms. A study of these 16 cases quickly shows that the 5 enumerated above were the only ones in which the correlation was at all convincing. The cases in question show phenomena possibly related to infection of ulcerative cancer surfaces, with some instances of a delusional coloring related to the tumors.

On the whole, accordingly, there cannot at present be erected a very persuasive argument for the oncogenesis of mental disease, but certain mental symptoms may possibly be altered by carcinoma. In one instance (Case VI), a Psychopathic Hospital case, the predominance of neurological symptoms in the vagus region of supply directed attention to the probability of the gastric carcinoma found at autopsy.

SOUTHARD, E. E. General Psychopathology. Psychological Bulletin, Princeton, N. J., and Lancaster, Pa., 1915, XII, 245-273.

Southard, E. E. Data concerning Delusions of Personality, with Note on the Association of Bright's Disease and Unpleasant Delusions. Presented in abstract at the sixth annual meeting of the American Psychopathological Association, held in New York City, May 5, 1915. Being Contribution of the State Board of Insanity No. 47 (1915.13). The material was derived from the pathological laboratory of the Danvers State Hospital, Hathorne, Mass., and the clinical notes were collected by Dr. A. Warren Stearns, to whom I wish to express my indebtedness, but to whom no one should ascribe the somewhat speculative character of the present conclusions. Journal of Abnormal Psychology, Boston, 1915, X, 241-262.

SUMMARY AND CONCLUSIONS.

The paper deals with delusions of a personal (autopsychic) nature, and is one of a series based upon certain statistics of Danvers State Hospital cases (previous work published on somatic, environmental (allopsychic) delusions and those characteristic of general paresis). The previous work had suggested that somatic delusions are perhaps more of the nature of illusions in the sense that somatic bases for somatic false beliefs are as a rule found. On the other hand, delusions respecting the environment (allopsychic delusions) had appeared to be more related to essential disorder of personality than to actual environmental factors.

The fact that cases of paresis with delusions were found to have their lesions in the frontal lobe, whereas non-delusional cases showed no such marked lesions, is of interest in the light of the present paper, because three cases of senile psychosis were found to have delusions of grandeur and, although they are demonstrably not paretic, they also show mild frontal lobe changes supported by microscopic study.

The Danvers autopsied series, containing 1,000 unselected cases, was found to show 306 instances with little or no gross brain disease. Of these, 106 had autopsychic delusions, and of these 106, 50 cases had delusions of no other sort; 15 of these 50 cases appeared to have been cases of general paresis in which gross brain lesions were not observed at autopsy, and upon

investigation 13 other cases were found to be, for various reasons, improperly classified. The residue of 22 cases was subject to analysis, and readily divides itself into two groups of 11 cases each, or two, groups of normal-looking brain cases having autopsychic delusions; and these only are cases which may be termed the "pleasant" and "unpleasant" groups, in the sense that the delusions in the first group were either pleasant or not unpleasant, whereas the delusions in the second group were of clearly unpleasant character.

Three of the "pleasant" delusion group were the three cases of grandeur and delusions in the senium above mentioned. Three others were cases of "theomania" in the sense that their delusions concerned messages from God. It is not clear that these three religious cases should be regarded as belonging in the group of "pleasant" delusions on account of the sense of constraint felt by the patients.

The remainder of the "pleasant group," as the delusions were originally defined, turned out for the most part to show either doubtful delusions or delusions involving a sense of constraint rather than of pleasure.

An endeavor was made to learn the relations of pulmonary phthisis to the emotional tone of the delusions. The few available cases in this series seem consistent with the hypothesis of phthisical euphoria (IV, "happiest woman in the world, hearing God's voice," VII and possibly XI).

The problems of the "pleasant" delusion group, as superficially defined, turned out to be (a) the problem of a group of senile psychoses with grandiose delusions and frontal lobe atrophy; (b) the problem of felt passivity under divine influence; (c) the problem of phthisical euphoria.

The group of "unpleasant" delusions in the normal-looking brain group should be diminished by one on account of its positive microscopy (encephalitis). One case (XIII) is a case of mixed emotions of religious type, showing phthisis pulmonalis, together with abdominal tuberculosis and nephritis. One case (XV) is doubtful as to delusions; the remainder are subject to renal disease, as a rule associated with cardiac lesions.

Two cases which were transferred from the "pleasant" to the "unpleasant" group on account of constraint feelings were also renal cases, — VII and IX. The only exception to the universality of renal lesions in this group is the case in which religious delusions were probably based upon hallucinations, for which hal-

lucinations an isolated brain lesion was found, very probably correlatable with the hallucinosis.

Virtually all of the 11 cases determined to belong in the "unpleasant" group are cases with severe renal disease as studied at autopsy.

Whether the unpleasant emotional tone in these cases of delusion formation is in any sense nephrogenic, and whether particular types of renal disease have to do with the unpleasant emotion, must remain doubtful. A still more doubtful claim may be made concerning the relation of euphoria to phthisis. The renal correlation is much more striking as well as statistically better based. A further communication will attack the problem from the side of the kidneys in a larger series of cases.

SOUTHARD, E. E. Dilatation of Cerebral Ventricles in Various Functional Psychoses. (Abstract.) Journal of Nervous and Mental Disease, New York, 1915, XLII, 741-743.

REMARKS.

Case of dementia præcox, manic-depressive insanity and involutional-melancholia studied photographically. The dilatation of the ventricles often more marked in posterior parts. Correlation of dilatation with excitement.

- SOUTHARD, E. E. The Feeble-minded as Subjects of Research in Efficiency.¹ Proceedings, National Conference Charities and Corrections, Chicago, 1915, XLII, 315–319.
- THOM, D. A., and SOUTHARD, E. E. An Anatomical Search for Idiopathic Epilepsy: Being a First Note on Idiopathic Epilepsy at Monson State Hospital. Being Contribution from the State Board of Insanity No. 46 (1915.12). Review of Neurology and Psychiatry, Edinburgh, 1915, XIII, 471–486. Also (Abstract) in Journal of Nervous and Mental Disease, 1918, XLVII, 57, 58.

SUMMARY AND CONCLUSIONS.

1. Seventy-six of 205 brains of institutional, but otherwise unselected, epileptic subjects, *i.e.*, 37 per cent, yielded brains without substantial lesions visible to the naked eye upon superficial examination or dissection.

¹ Not published in State Board of Insanity Contribution (1915.23).

- 2. This percentage of "normal-looking" brains is rather higher than has hitherto been found in institutional, psychopathic, non-epileptic subjects, although the dissections in the epileptic group have probably not been so extensive as in the psychopathic group.
- 3. A study has been made of 76 epileptics with normal-looking brains, with the hope of securing a number of "idiopathic" cases for special examination.
- 4. In order to secure a group of pure epilepsy, 68 cases had to be excluded as being complicated with feeble-mindedness, acquired dementia, or other psychotic symptoms, leaving 8 apparently non-psychotic epileptics for study. Of these 8, 1 had facial palsy, 1 had organic-looking symptoms, and 2 had chronic leptomeningitis. Dismissing the 2 cases of chronic leptomeningitis we have 6 cases from which a truly idiopathic brain, from a histological point of view, may be isolated, and it is upon these 6 brains that further study must be made.
- 5. The whole series affords an opportunity for general conclusions on certain classical questions of epileptology, for example:—

Age at Onset (Table II). — (a) Seventy-two cases out of a total of 76 with normal-looking brains where the age at time of first convulsions was known. Eighteen (25 per cent) began between eleven and fifteen years, a period quite significant for the disturbance of the nervous system, already predisposed to psychochemical changes. Of the 118 cases with abnormal brains (with history of onset established), only 9.3 per cent had their onset during this same period. (b) The abnormal series show that the percentage of cases (11 per cent) where the age at onset was under one year was twice as high (5.5 per cent) as the normal series (suggesting birth injuries and congenital defects). All those cases where the epilepsy began after the fortieth year were about equally divided between the normal and abnormal group.

Duration of Epilepsy (Table III). — The cases where the duration was of thirty-five years or more were divided as follows: 18.4 per cent abnormal group; 5.3 per cent normal group. Those with shorter durations were about equally divided between the two groups.

Age at Death (Table IV). — Average age of patient at time of death, in normal group, 38.9 years; abnormal group, 41.44 years.

Heredity (Table V). — Heredity present in 24 per cent normal cases, 20 per cent abnormal cases, being about equally divided in either group into the same and allied types of heredity.

Mental Status (Table VI). - Only 10 per cent of the cases in

either group that did not present mental symptoms, dementia being more frequent in the normal group (46 per cent), while feeble-mindedness predominated in the abnormal group (53 per cent).

Number of Convilsions (Table VII). — Cases with minimum number of convulsions, one or less a month belonged largely to abnormal series, while the cases where the convulsions occurred once a day or more frequently were usually found in the normal series.

Assigned Causes of Epilepsy (Table VIII). — The assigned causes varied so widely, and in so many instances were unknown, that the data were of little significance, excepting that head injuries were given as the cause in 9.1 per cent in the normal series and in 10 per cent in the abnormal series. Alcohol, normal series, 5.2 per cent; abnormal series, 1 per cent. The causes of death were also so numerous that the data are of little importance, excepting that tuberculosis was the cause of death in about 10 per cent of all cases in either group.

Alcohol and Syphilis in Patients (Table IX). — Alcohol, 12.5 per cent normal group; 10 per cent abnormal group. Syphilis, 1.5 per cent normal group; 2.3 per cent abnormal group.

We feel that, contrary to the expression of the numerous authors already quoted, there still remains some doubt that all epilepsies are organic in nature, and it has been the purpose of this note to introduce a more logical method of anatomical search for idiopathic epilepsy than has hitherto been applied to the problem.

SOUTHARD, E. E. Advantages of a Pathological Classification of Nerve Cells, with Remarks on Tissue Decomplication as shown in the Cerebral and Cerebellar Cortex. Being contribution of the Massachusetts State Board of Insanity No. 121 (1915.24). Transactions, Association of American Physicians, Philadelphia, 1915, XXX, 531-546. Also in Bulletin, Massachusetts Commission on Mental Diseases, Boston, 1918, II, 75-89.

REMARKS.

Enough has been said to show that neuropathological research:—

1. Might do well to engage on a program of studying by available methods the differential viabilities of the various nerve-

¹ Not published in State Board of Insanity Contributions (1915.24).

cell types, thereby erecting an essentially "pathological" classification of nerve cells on the basis of their powers of resistance or survival values.

2. Might endeavor to collect data as to the differential effects of simplification or "decomplication" of nerve tissues, having in mind the evolutionary or survival values of the functions which different forms of decomplication would destroy or leave intact.

1915-16.

Southard, E. E., and Canavan, M. M. Focal Lesions of the Cortex of the Left Angular Gyrus in Two Cases of Late Catatonia. Being Scientific Contribution of the State Board of Insanity No. 119 (1915.22). Read at the seventy-first annual meeting of the American Medico-Psychological Association, Old Point Comfort, Va., May 11–14, 1915. American Journal of Insanity, Baltimore, 1915–16, LXXII, 553–580. Also in Proceedings, American Medico-Psychological Association, Baltimore, 1915, XXII, 227–254.

Conclusions.

The writers present two cases of chronic lesion of the left angular gyrus which received the clinical diagnosis of dementia præcox. One case showed a cyst of softening and the other a solitary tubercle. It appears that both lesions may well be of suitable age to correspond with the date of onset of the symptoms. Although not in all respects typical, the diagnosis of dementia præcox seems to have been accepted by the Boston State Hospital officers in charge of the cases. Decidedly atypical is the age of onset of the first case, at forty-one; the second case had its onset at thirty-six.

The writers are especially interested in the fact that the isolated lesions in these cases are in the parietal region, a region which has been stated in previous work from this laboratory to be correlated with catatonic symptoms. Plates are presented showing the site of the lesions.

1916.

- SOUTHARD, E. E. The causes of feeble-mindedness. Read before the American Association of Clinical Criminology, at Buffalo, October, 1916. Proceedings, Annual Congress, American Prison Association, 1916, 186–197.
- SOUTHARD, E. E. A Frequency List of Mental Symptoms found in 17,000 Institutional Psychopathic Subjects (Danvers State Hospital, Massachusetts). (Abstract.) Journal of Nervous and Mental Disease, New York, 1916, XLIII, 56, 57.
- Southard, E. E. General Psychopathology. Psychological Bulletin, Princeton, N. J., and Lancaster, Pa., 1916, XIII, 229-257.
- Notes on Medical and Social Progress, especially in Neuro-syphilis, Boston, Mass., 1915. Being State Board of Insanity Contribution No. 131 (1915.34). Boston Medical and Surgical Journal, 1916, CLXXIV, 50-53 and 81-85.

SUMMARY.

The writer has endeavored in these notes to present the neurosyphilis situation as it faces us locally, and has not endeavored to sum up the neurosyphilis situation in general. Still it is clear that among the ten papers of the present series will be found briefly mentioned most of the aspects of the neurosyphilis problem which are appealing to the world at the present time. The humanity of Dr. Post's remarks in Article I needs no comment. Especially wise is his note that "when a social worker comes into the family of the syphilitic, she must dismiss from her mind any presupposed guilt." It is also important to take seriously Dr. Post's point that when all the laboratory signs of syphilis of the nervous system are present, and no clinical features of neurosyphilis are outstanding, there must be a serious question whether the clinical work is being done effectively. We need very intensive clinical work in the field of neurosyphilis at the present time. We cannot get on with the kind of loose work which prevails, it is to be feared, in certain fields of private practice and in certain institutions.

The eagerness with which social workers are beginning to take up the problem of the examination and prophylaxis for syphilitic patients and their families, and the entirely scientific manner of the approach of these social workers to their problem, are to be seen clearly in the communication of Miss Wright (Article II) and of Miss Jarrett (Article III), as well as in the spirit of Dr. Gregg's article (IV) on "Some Economic Facts of the Problem." How concrete the social worker's confrontation of the problem is can be seen from the appendices to Miss Wright's article (Article II), embodying the blank forms which are used in the syphilis family investigation. The syphilis of railroad men and even of a lighthouse man, of caterers, cooks and nursemaids, mentioned by Dr. Gregg, is a mention of nothing new to the community; vet we cannot be too insistent upon the familiarity of such information. These facts should stand out prominently in our propaganda.

Article V, by Beasley and H. M. Anderson, upon the mental features of the congenital cases, is a mere beginning of work in this direction. How much of our truancy and juvenile court problem is due to congenital syphilis cannot yet be safely estimated, but whatever the true percentage of the luetic fraction among these antisocial cases, the absolute numbers are sizable enough to warrant attention. The impairment of the sense organs and the elementary psychic apparatus, brought out in this article as characteristic of congenital syphilitics, is of some general importance.

There follow articles (VI, VII, VIII and IX) upon the diagnostic situation in neurosyphilis. Article VI, by Solomon and his associates, is a continuation of his previous work, and not only emphasizes the fact that the gold sol examination is essential in cerebrospinal fluid examinations, but also that it is at present impossible to tell the paretic from the non-paretic form of neurosyphilis. Upon this fact is based the important conclusion above mentioned in the ninth section of these notes.

Article VII shows that the cell count in the cerebrospinal fluid is not an index to the quality or degree of irritative and paralytic changes shown in the symptoms of cases of neurosyphilis.

Article VIII brings up a rather large question, — whether the laboratory signs of neurosyphilis, and, in particular, signs of extensive chronic inflammation of the nerve system, appear before the occurrence of any characteristic mental symptoms. We have been fortunate to discover a certain number of these cases which,

of course, will often elude observation because, having no mental symptoms or other symptoms of importance, such cases would not naturally be subject to intensive examination. An extension of family work in syphilis, and especially neurosyphilis, may uncover a great many more of these cases that we have termed "latent" neurosyphilis, or somewhat fantastically, general paresis sine paresi. Do these findings indicate certain unsuspected conditions in the genesis of neurosyphilis? It is too early to make such a claim. It is certain that, after all, such cases deserve immediate and intensive treatment.

Article IX makes a special point concerning the gold sol reaction, namely, the point that the cerebrospinal syphilitic gold sol reaction is in some sense a *forme fruste* of the characteristic paretic reaction. Should this point be maintained, the essential unity of the two conditions would be still further established. The true explanation of the *forme fruste* here described must probably await developments in colloidal chemistry.

Article X, of which the present paragraph forms a part, endeavors to give a brief account of the special aspects of the neurosyphilis situation which have attracted attention at the Psychopathic Hospital.

Southard, E. E., and Solomon, H. C. Latent Neurosyphilis and the Question of General Paresis, Sine Paresi. Being State Board of Insanity Contribution No. 129 (1915.32). The general conclusions of this paper were read by Dr. Solomon at the April meeting of the Boston Society of Psychiatry and Neurology. Boston Medical and Surgical Journal, 1916, CLXXIV, 8-15.

SUMMARY.

- 1. There is a group of cases showing the laboratory signs characteristic of central nervous system syphilis: (a) positive Wassermann reaction in the serum, (b) positive Wassermann reaction in the spinal fluid, (c) pleocytosis, (d) excess of globulin and (e) of albumin in the spinal fluid, (f) gold sol reaction of central nervous system syphilis, and which show no sign or symptom of neural syphilis.
- 2. We believe these cases represent a form of chronic cerebrospinal syphilis, probably paretic in type.
- 3. They have the greatest theoretical and practical significance in the consideration of the life history of neural syphilis, in the

concept of allergie, in regard to results of treatment, and finally as to the evaluation of the laboratory tests.

- 4. Here is perhaps offered the last link to form a complete chain between the symptoms of the primary stage of syphilis and its final termination of life as the result of the diseases cerebrospinal syphilis or general paresis.
- SOUTHARD, E. E. The Major Divisions of Mental Hygiene Public, Social, Individual. Massachusetts Society for Mental Hygiene Publication No. 18, from the Boston Medical and Surgical Journal, 1916, CLXXV, 404-406.
- SOUTHARD, E. E. Social Research in Public Institutions.¹ Proceedings, National Conference, Charities and Corrections, Chicago, 1916, 376–386.
- Southard, E. E. Psychopathic Delinquents.² Proceedings, National Conference, Charities and Corrections, Chicago, 1916, 529-538.
- Southard, E. E. The Psychopathic Hospital's Function of Early Intensive Service for Persons not Legally Insane.³ Being Contribution No. 154 (1916.12) "The Psychopathic Hospital's Function of Early Intensive Service for Persons not Legally Insane," in Proceedings of the National Conference of Charities and Corrections, 1916. Published in the Journal of Educational Psychology, December, 1916, Vol. VII. (Abstract.) Proceedings, National Conference, Charities and Corrections, Chicago, 1916, 277-279.
- Southard, E. E. Dissociation of Parenchymatous (Neuronic) and Interstitial (Neuroglia) Changes in the Brains of Certain Psychopathic Subjects, especially in Dementia Præcox. Being M. C. M. D. Contribution No. 164 (1916.22). Transactions, Association of American Physicians, Philadelphia, 1916, XXXI, 293–310. Also in Bulletin of Massachusetts Commission on Mental Diseases, Boston, 1917, I, 236–253.

¹ Not published in Bulletin of Massachusetts Commission on Mental Diseases. (1916.10).

² Not published in Bulletin of Massachusetts Commission on Mental Diseases. (1916.11).

³ Not published in Bulletin of Massachusetts Commission on Mental Diseases. (1916.12).

SUMMARY.

To sum up: —

- 1. Parenchymatous (neuronic) lesions and interstitial (neuroglia) lesions may be dissociated and combined, much as similar lesions in the kidney.
- 2. A case of manic-depressive psychosis failed to show convincing degrees of parenchymatous lesions.
- 3. Dementia præcox cases had marked parenchymatous disorder, to which gliosis was not at all proportionate.
- 4. It is necessary to find and study by like methods a good group of non-tuberculous cases of dementia præcox, so as to exclude tuberculosis from having a share in the production of these lesions.
- SOUTHARD, E. E. The Comparative Convolutional Complexity of Male and Female Brains. (Abstract.) Science, Lancaster, Pa., 1916. (New series, Vol. XLIII, 900.)

REMARKS.

The material for the study consists of brain photographs (six views of each brain) in the collection of the Massachusetts State Board of Insanity, derived from over 500 brains in the possession of various State and private institutions of Massachusetts, including so-called "normal" brains and brains from a variety of psychopathic subjects. The method of the study is numerical, based upon counts of fissures and fissurets. The results, so far as interpretable, show no great sex difference in degree of fissuration.

Southard, E. E. On the Application of Grammatical Categories to the Analysis of Delusions. The Philosophical Review, 1916, XXV, 424-455. Also in Bulletin of Massachusetts Commission on Mental Diseases, Boston, 1917, I, 22-50.

REMARKS.

The object of this paper has been to illustrate the method of Royce's logical seminary at Harvard. No attempt has been made to describe the method, which is comparative rather than observational or statistical. When the logician superposes the categories of Science A upon the material of Science B, or compares the categories of both, he is not at all sure of important

results. If he obtains too extensive or too numerous identities by means of his comparisons, he may be compelled to decide that identity of categories means actual unity of materials. Thus, in the present instance, the reader may be the more ready to swallow the identity of certain categories in grammar and psychopathology, simply because he fundamentally believes in a larger degree of identity of speech and thought. In the event of such a nominalistic view as that, the only merit of the present essay would consist in spreading a sound method over new materials of the same sort; the method would not then be comparative in a very rich sense of the term. But, even if speech and thought are as closely allied as, e.g., Max Müller thought them to be, the fact still remains that the categories of linguistics and of psychology have not been wrought into their present form by the same group of men or under the same group of interests. If there is a partial identity of scientific materials, there is no evidence of identity of categories. The comparative method will then obtain a certain scope, even if that scope is limited to trying-out of special methods devised by linguists inexpert in technical psychology.

I hesitate to set forth the point; but I am left with a queer impression that linguistics falls short of representing logic in somewhat the same way that psychopathology falls short of representing psychology. I do not so much refer to the prevalence of concepts like "phonetic decay," "empty words," "anomalism," etc., in linguistics, although these concepts certainly suggest human frailty quite outside the frame of classical logic. I do not wish to construct a false epigram to the effect that linguistics is a kind of pathology of logic, attractive as this epigram might be. My point is that human facts are got at more readily in linguistics and in psychopathology than in logic and in so-called normal psychology.

For example, if I try to determine the logical modality of something and to affix the proper epithet (necessary, impossible, contingent, possible), I sink into a morass of factual doubts. But, equipped with the fundamental grammatical moods (imperative, indicative, subjunctive, optative), I can dismiss my doubts by describing them under one of these mood aspects, regardless of objective reality, truth to me, truth to Mrs. Grundy, or any situation except that depicted by the statement in question. The grammatical moods deal with evidence unweighed; the logical modalities require more weighing of evidence than is as a rule humanly possible. Psychopathology also deals with

evidence unweighed. Particularly is this true of that portion of psychopathology which deals with false beliefs. that some beliefs are prima facie fantastic and to us incredible. By the patient these fantastic and incredible beliefs are believed, but the nature and history of these fantastic beliefs may well be investigated to learn whether we are not dealing with a so-called wish-fulfilment (a Freudian technical term) or with a kind of degradation of what the linguist might term an optative attitude. But the majority of false beliefs are not prima facie fantastic and incredible. They, on the contrary, require the test of experience. They represent pragmatic situations. Granting the truth of certain hypotheses, we say, these beliefs might be accepted also as truth. Our thesis is that these pragmatic delusions do not represent a conceived wish-fulfilment, if by wish is meant a fancied situation. On the other hand, these pragmatic delusions appear to hang rather upon the degradation of a subjunctive attitude, that is, upon taking as true a certain hypothesis. But neither fantastic nor pragmatic delusions can readily be classed under the logical modalities, e.g., as possible or contingent, however possible and contingent they actually seem to the patient. In any event, they are or will shortly turn out to be impossible, logically speaking, and if the patient were to ascribe any logical modality thereto he would be likely to deal in necessities on the one hand and impossibilities on the other. Grammatically speaking, the degraded optative belief may even set into an imperative, and beliefs degraded from both the optative and the subjunctive appeal to the patient as indicative, if not yet imperative.

From our superficial study of the categories of grammar as they revolve about the verbs, we have come upon two considerations of value that are not entirely obvious, the psychopathic analogue of the grammatical "voice," and the question of two main types of delusion degraded, respectively, from "subjunctive" and "optative" attitudes.

I believe that the "voice" distinction will forthwith appeal to all psychiatrists as valid within its range. The distinction seeks to express the relation between the world and the individual from the individual's point of view under two forms, (a) that in which the self is active, and (b) that in which the self is passive in relation to the environment; but in the third place (c) the relation of the individual to himself is suggested, viz., under the "middle" or reflexive relation. Whether the reflexive relations of the self

break up further into a group where the "I" dominates the "me" and another where the "me" overpowers the "I" (that is, whether the ego is sometimes active in respect to itself and sometimes passive), is a question partly of fact, but more of the nature of the self and of the whole difficult topic of self-activity.

Whether the distinction between pragmatic delusions (as it were, precipitated subjunctives) and fantastic delusions (as it were, precipitated optatives) is valid must remain undetermined. The distinction has at least the value of suggesting a similar distinction in human character in general; both distinctions may be derived from identical psychological facts.

If in the practical handling of a patient, or indeed of any one else in a situation hard to interpret, the observer can make out the "voice" of the subject's situation from the subject's point of view, and can secondly determine whether the difficulty rests upon trouble with hypotheses or trouble with wishes, much is gained surely.

We saw also from our incidental study of person, number, and gender how important might become the question of monadic, diadic, triadic, or polyadic situations involving false beliefs. The collection of groups of such situations for analysis is certainly indicated, naturally with invariable reference to the "voice," active or passive, of the patient or central figure. Fiction and drama could throw some light on these matters.

In the gathering of data for analysis, it is clear also that the time-relations must also be studied from the patient's point of view, to the end of determining whether the particular subjunctive precipitate has relation to some central point in the past, whether the particular optative precipitate has relation to a present or present perfect situation, or whether other "tenses" come in question.

SOUTHARD, E. E. The Comparison of the Mental Symptoms found in Cases of General Paresis with and without Coarse Brain Atrophy. Being Contribution of the State Board of Insanity No. 38 (1915.4). Journal of Nervous and Mental Disease, 1916, XLIII, 204-216.

SUMMARY AND CONCLUSIONS.

The possession of a suitable statistical background (the Danvers Case Symptom Index) has rendered worth while an orienting study in the mental symptomatology of general paresis. A

group of 38 general paretics whose brains were specially examined and described by the writer has been divided into two groups according to whether there was or was not coarse evidence of brain atrophy. The cases without brain atrophy were termed "mild" and those with brain atrophy were termed "severe," although these designations are only approximations to accuracy; the groups are, however, in no sense "early" and "prolonged."

Symptomatically the two groups show several surprising concordances and a number of instructive divergencies. Thus amnesia, motor restlessness, disorientation, dementia and depression lead both series and in that order (except that allopsychic delusions stand fourth in the "mild" series and are far less common in the "severe"). Are amnesia and dementia, therefore, in no sense proportional to brain tissue loss?

Nineteen symptoms occurred in 20 per cent or over of the paretic series, viz., the five just mentioned, and nine others (irritability, defective judgment, psychomotor excitement, autopsychic delusions, insomnia, aphasia, hallucinations of doubtful or unspecified nature, convulsions, visual hallucinations) not always in like proportion in the two series. Five other symptoms occurred in each series, but symptoms quite sundered from one another in general significance.

The "mild" cases showed a group of symptoms which might be termed contra-environmental, viz., allopsychic delusions, sicchasia (refusal of food), resistiveness, violence, destructiveness.

The "severe" cases showed a group of symptoms of a quite different order, affecting personality, either to a ruin of its mechanisms in confusion and incoherence, or to the mental quietus involved in euphoria, exaltation or expansiveness.

Some speculations are offered in the text as to the perversion of inhibition or inco-ordination of inhibition which the largely irritative lesions of the "mild" cases are presumably effecting in the perhaps more seriously affected frontal areas. When these are still more gravely affected, as to the point of atrophy, then the intrapsychic disorder might well become more manifest, e.g., in the distinctive symptoms of the "severe" group just mentioned.

In a series of 17,000 clinical cases (of all sorts of mental disease, alive and dead, recovered and impaired) symptomatologically analyzed, there were but ten symptoms occurring in 20 per cent or over; these were, in order, psychomotor excitement, allopsychic

delusions, dementia, auditory hallucinations, motor restlessness, depression, autopsychic delusions, insomnia, incoherence, amnesia. Each of these is represented high in general paresis (i.e., in 20 per cent or over), except that auditory hallucinations are infrequent in both "mild" and "severe" cases, and allopsychic delusions are infrequent in "severe" cases. There may be topographical reasons for the paucity of auditory hallucinations in general paresis. The method of production of allopsychic delusions in general paresis should be studied, since there can be no such alliance of allopsychic delusions and auditory hallucinations therein as is perhaps the rule in dementia præcox.

If we consider the next nine symptoms in order in 17,000 cases of mental disease at large, viz., violence, visual hallucinations, irritability, defective judgment, disorientation, destructiveness, confusion, resistiveness and somatic delusions, we find only the last, viz., somatic delusions, not represented in either group in fair proportion, although (as above stated) confusion is poorly represented in the "mild" cases and violence, destructiveness and resistiveness are poorly represented in the "severe" cases.

Aphasia, hallucinations of doubtful or unspecified nature and convulsions appear to be frequent symptoms in general paresis that do not figure at all so largely in mental disease as a whole. Besides these, sicchasia of the "mild" group, and euphoria, exaltation and expansiveness of the "severe" group, appears to stand out for general paresis against mental disease as a whole.

The most positive results of this orienting study appear to be the unlikelihood of *euphoria* and allied symptoms in the "mild" or non-atrophic cases, and the unlikelihood of certain symptoms, here termed *contra-environmental*, in the "severe" or atrophic cases. Perhaps these statistical facts may lay a foundation for a study of the pathogenesis of these symptoms. Meantime the pathogenesis of such symptoms as *amnesia* and *dementia* cannot be said to be nearer a structural resolution, as these symptoms appear to be approximately as common in the "mild" as in the "severe" groups.

1917.

Southard, E. E., and Canavan, M. M. Autopsy Material of Poliomyelitis Epidemic of 1916. (Abstract.) Journal of Nervous and Mental Disease, 1917, XLVI, 217, 218.

SOUTHARD, E. E. On Descriptive Analysis of Manifest Delusions from the Subject's Point of View. Being M. C. M. D. Contribution No. 150 (1916.8). Journal of Abnormal Psychology, Boston, 1916–17, XI, 189–202. Also in Bulletin of Massachusetts Commission on Mental Diseases, Boston, 1917, I, 80–91.

SUMMARY.

The writer aims at a descriptive analysis of manifest delusions and false beliefs taken subjectively, i.e., from the patient's point of view. He regards this as an indispensable preliminary to explanatory synthesis of psychopathic situations, even should it turn out that aliquid latens is the nucleus of such situations. Practically he proposes a minimum of terms which the tyro in psychiatric examination must aim to get from a lucid patient entertaining or alleged to entertain false beliefs. In addition to (a) the person or persons involved, (b) the number of persons involved, (c) the sex of these persons, (d) the time, past, present or future, in which the noxious event or condition is believed to occur, the writer deals also with (e) the "voice" in which the patient takes himself to be. The patient from his own point of view regards himself as at odds with the environment

(1) as it were actively (PATIENT>ENVIRONMENT)

or (2) as it were passively (PATIENT < ENVIRONMENT), or again as at odds with himself, either

(3) with higher (spiritual) self dominant (EGO>"ME")

or (4) with lower (material) self dominant (EGO < "ME").

The writer deals also with (f) the distinction of "mood," finding that patients above the "imperative" level entertain either irrational delusions or fantastic ones. The writer speculates that irrational (pragmatic) delusions represent hypotheses taken as facts (i.e., "subjunctives" degenerating into "indicatives"), and that fantastic (prima facie false) beliefs represent wishes taken as facts (i.e., "optatives" degenerating into "indicatives"). Possibly those who transcend the imperative and indicative levels in normal development split into two classes of persons, those with a leaning toward hypotheses (highest development, men of science) and those with a leaning toward wishes (highest development, artists). In the body of the paper some account is given of the comparative method by which these items of psychiatric analysis were obtained, a fuller account of which has appeared in the "Philosophical Review" in a paper written in honor of Prof. Josiah Royce.

- SOUTHARD, E. E. General Psychopathology. Psychological Bulletin, Princeton, N. J., and Lancaster, Pa., 1917, XIV, 193-215.
- SOUTHARD, E. E. The Correlation of Brain Anatomy, Mental Tests and School or Hospital Records in a Series of Feebleminded Subjects (Waverley Anatomical Research Series). (Abstract.) Journal of Nervous and Mental Disease, Lancaster, Pa., 1914, XLIII, 454-457.

REMARKS.

Dr. Southard presented an account of the first instalment of work on the brains of the feeble-minded done under the auspices of the Waverley School for Feeble-minded. He called attention to the extraordinarily small amount of work which has been done upon the anatomy of brains of feeble-mindedness, speaking of the work of Bourneville, Hammarberg and the early work of Wilmarth in this country. He spoke of the present as an auspicious period for work in this field on account of the great achievements in cortex topography of recent years. He described the systematic photography of the brains from above, below, from the two sides and from the two mesial aspects, and of the further photography of frontal sections. Thereupon microscopic work could be done with the full advantage of correlations with

the gross appearances, such as anomalies, atrophies and other focal lesions.

Another reason for working eagerly at this topic at this time was the fact that mental tests are now available, so that we can compare: (a) the psychometric level of the patient, (b) the functional level of the patient as exhibited clinically and educationally, and (c) the level of brain development.

The speaker insisted upon the importance of studying efficiency in the material of feeble-mindedness. He considered that feeble-mindedness forms the best material now available for research in efficiency, and called attention to the fact that all the modern books upon efficiency had neglected the field. Just as the Montessori method was a logical descendant of the work of Séguin, so new ideas in the education of the normal derive from the more modern work in the education of the feeble-minded.

If correlations between the psychometric and practical capacity levels of the patients on the one hand, and the trained brains on the other, can be made, then possibly something new concerning the nature of work in this connection, and comparison between appearances in the parietal lobes and those in the frontal lobes, would obviously be of importance.

Southard, E. E., and Canavan, M. M. The Stratigraphical Analysis of Finer Cortex Changes in Certain Normal-looking Brains in Dementia Præcox. Being M. C. M. D. Contribution No. 166 (1916.24). Journal of Nervous and Mental Disease, New York, 1917, XLV, 97–129. Also in Bulletin of Massachusetts Commission on Mental Diseases, Boston, 1917, I, 261–293.

SUMMARY AND CONCLUSIONS.

The writers present an analysis, chiefly stratigraphical, of certain lesions, notably nerve cell loss and gliosis (including satellitosis) in four cases of dementia præcox. These cases were cases which showed no gross aplasia, sclerosis or atrophy in the gross and yet exhibited symptoms of two years' or greater duration, entitling them to be considered in the dementia præcox group.

In connection with this work, a review of Kraepelin's estimate of structural work in dementia præcox brains is offered, and the

stratigraphical data are presented in relation to Kraepelin's views as to the functions of suprastellate and infrastellate layers.

Absence of suprastellate lesions in a case of the paranoic or paraphrenic group was noted, but there was no special evidence of schizophrenia in this case as clinically viewed; the case did show infrastellate lesions in areas contiguous with one another in the two flanks of the brain. It might be possible to correlate the late catatonia and late hallucinosis in the case with these infrastellate lesions. Other cases possibly more typical of dementia præcox exhibited lesions both in the suprastellate and infrastellate regions, sometimes numerous, sometimes isolated and apparently capricious in distribution. No good example of lesions chiefly limited to the suprastellate layers has been found.

Gliosis and satellitosis do not follow the nerve cell losses. The same holds true of shrinkage changes and axonal reactions. Nor is satellitosis closely associated either with shrinkage changes (which are not numerous in this series) or with axonal reactions. The dissociation of parenchymatous (neuronic) and interstitial (neuroglia) changes reported in a previous communication is further emphasized.

- SOUTHARD, E. E. The Effects of High Explosives upon the Central Nervous System: A Review of Mott's Lettsomian Lectures, 1916, and G. Elliot Smith's "Shell Shock and its Lessons." Mental Hygiene, Concord, N. H., 1917, I, 397-405.
- Southard, E. E. Proposals for a Sequence of Disease Groups to be successively considered in the Practical Diagnosis of Mental Diseases. (Abstract.) Journal of Nervous and Mental Disease, New York, 1917, XLVI, 277–279.

REMARKS.

The proposals look to a practical rather than a theoretical ordering of mental disease groups. The classification is "artificial" rather than "natural," as John Stuart Mill used those terms. The familiar issues of etiology and entifiability are not here raised. Instead, the fundamentum divisionis is the practical ("artificial") one of separation along lines of available tests in the interest of differentiated treatment or counsel; e.g., the syphilitic group stands first, neither in virtue of frequency nor of theoretical simplicity, but because of the complement-fixation

test, and the therapeutic possibilities in the syphilitic group. But the method is not necessarily one of successive elimination of disease groups until the correct group is reached. In the majority of cases the entire gamut of a dozen or more groups must be applied. For a given case may be one, e.g., of a syphilitic, feeble-minded, epileptic, alcoholic, senile with coarse brain disease. A provisional sequence is composed of the syphilitic, feeble-minded, epileptic, alcoholic, encephalopathic, somatopathic, senescent, schizophrenic, cyclothymic, psychoneurotic, psychopathic, special, dubious and simulant groups, and the non-psychotic.

SOUTHARD, E. E. On the Focality of Microscopic Brain Lesions found in Dementia Præcox. Being M. C. M. D. Contribution No. 201 (1917.21). Archives of Neurologie and Psychiatrie, 1919, I, 172–192. Also in Transactions, Association of American Physicians, Philadelphia, 1917, XXXII, 435–459, and Bulletin of Massachusetts Commission on Mental Diseases, Boston, 1918–19, II, 45–67.

SUMMARY.

Thanks to the work of Elliot Smith, Bolton, Campbell, Brodmann, Ramon y Cajal and others, the neuropathologist can now afford to attempt finer functional histologic correlations in the field of mental diseases, thus aiding in the problems of microlocalization. The antilocalizing tendencies of the Wundtians and the interest in merely logical categories taken by Freudians should not interfere with progress in microlocalization. Dementia præcox, for example, can be called a matter of maladaptation of the patient to his environment or of the patient to himself, and also a disease characterized by cortical changes.

Previous work had shown anomalies in a high proportion of dementia præcox brains, and in a correspondingly low proportion of the brains of manic-depressive subjects. These anomalies may well be interpreted as weak places in these dementia præcox brains, and the brains in fact are apt to show scleroses and atrophic processes over and above the anomalies. But certain perfectly normal-looking brains in dementia præcox also show the same microscopic changes in lesser degrees than are found in the anomalous sclerotic and atrophic brains. The problem of the present communication has been to work out the focality of these microscopic lesions in a few normal-looking brains studied

with unusual intensiveness. In the same series of brains, work of previous seasons had shown a dissociation of parenchymatous (neuronic) and interstitial (neuroglia) changes, indicating a tendency on the part of cortex pathology to resemble the pathology of the kidney. But the majority of brains show mixtures of the parenchymatous (neuronic) and the interstitial (neuroglia) lesions. Recent work in comparative anatomy indicates the rather fundamental importance of distinguishing the functions of the upper cortical layers (what may be called the supracortex) from the functions of the lower cortical layers (what may be called the infracortex). The finer processes of mental dissociation (schizophrenia) ought to be correlated with lesions of the supracortex, and such lesions were found in cases with evidence of schizophrenia.

On the other hand, in a case of delusions characterized by no splitting (schizophrenia) whatever, but rather by a process of overelaborate synthesis, there was no evidence of supracortical disorder, and, in fact, no proposal can be made for any histologic correlate with this process of oversynthesis.

Other processes equally characteristic of dementia præcox, but logically far simpler in their make-up, such as auditory hallucinosis and muscular hypertension (catatonia), received suggestive correlation with processes in the lower layers of the temporal and parietal regions, respectively.

As far as the tissues of these four cases go, there is little or nothing inconsistent in the findings with the hypothesis that ordinary (non-phantastic) delusions are correlated with frontal rather than with otherwise situated lesions; but the supracortical type of delusions found in certain long-standing paranoiacs, whose fine mental processes run in a quasi-normal manner, find no special correlation in any region, and the probable lines on which this problem is to be solved remain obscure.

As for auditory hallucinosis, the work seems to afford the expected correlation with temporal lesions. In one case, however, temporal lesions of considerable severity were not attended in life by hallucinations of hearing, but in this case there was also a severe supracortical disease of the temporal region, and it may be that for the production of hallucinations, some congress is necessary between the activation of the supracortex and infracortex, respectively.

In previous work on this series, the brains had indicated a postcentral and superior parietal correlation for catatonia whose muscular hypertension was accordingly regarded as very possibly a kind of morbid kinesthesia. Present work suggests that the anatomic correlate is not merely to the postcentral and parietal regions, but still more specifically to the infracortical parts of these regions.

It may be suggested that the lesions found in samples of tissue in the postcentral, superior parietal, inferior parietal and superior temporal regions indicate a certain systemic tendency in the underlying processes, for these lesions were bilateral, and occurred, as it were, in two continuous sheets of tissue on both flanks of the brain in one of the best defined of our cases; these flank lesions were not attended by any similar lesions of the frontal, precentral, occipital and lower temporal and smell regions. The nature of a process which could mildly affect nerve cells and neuroglia on two sides of the brain, and also specially affect the infracortical rather than the supracortical portions of these affected sheets of tissue, remains a mystery. It is perhaps no greater mystery than that which attends the distribution of lesions in the spinal cord of pernicious anemia. It remains unsettled whether these lesions are secondary in point of time to a non-cell-destructive phase in the disease, or whether the lesions of which these microscopic effects are indicators began pari passu with the symptoms; that is, it remains a question whether we are dealing with the excess wear-and-tear process of cell mechanisms morbidly employed, or whether the morbidity of neural function is an exact equivalent of the neuronic and neuroglia morbidity.

SOUTHARD, E. E., and SOLOMON, H. C. Neurosyphilis, Modern Systematic Diagnosis and Treatment presented in 137 Case Histories. Boston, 1917, W. M. Leonard, 496 pp., 8°.

SOUTHARD, E. E. Alienists and Psychiatrists: Notes on Divisions and Nomenclature of Mental Hygiene. Being M. C. M. D. Contribution No. 187 (1917.7). Mental Hygiene, Concord, N. H., 1917, I, 567-571. Also in Bulletin of Massachusetts Commission on Mental Diseases, Boston, 1917-18, I, Nos. 3 and 4, 201-205.

Conclusions.

It is proposed that the term *alienist* be used of experts in the forensic or medicolegal subdivision of mental hygiene, dealing with *insanity*.

It is proposed that the term *psychiatrist* be used of medical experts concerned with *mental diseases*.

As a minor point in nomenclature, it is proposed to distinguish the alienistics of a case from the psychiatry thereof. As insanity stands to mental disease, so alienistics would stand to psychiatry. Alienistics would be primarily a branch of law; psychiatry a branch of medicine.

Five or six subdivisions of mental hygiene are mentioned as existent or developing.

Public mental hygiene has the two well-established subdivisions, institutional and medicolegal.

Social mental hygiene has produced effective social service. It is a question how far character handicap work can go; but there are signs of a specialty in mental hygiene here also, using practical psychiatric, social-service and social-psychological categories.

Personal or individual (medical) mental hygiene is founded on the achievements of practical psychiatry, which may now be regarded as a specialty independent of institutional mental hygiene and of "alienistics." But metric psychiatry is gaining ground, following the work of Binet, and "mental tests" promise to be of value not only in "mind-lack" and "mind-loss" questions of practical psychiatry, but also (at least negatively) in the field of character handicap work in employment and vocational choice.

- Southard, E. E., and Solomon, H. C. Notes on Gold Sol Diagnostic Work in Neurosyphilis (Psychopathic Hospital, Boston). Being M. C. M. D. Contribution No. 165 (1916.23). Bulletin of Massachusetts Commission on Mental Diseases, Boston, 1917, I, Nos. 1 and 2, 254–260. Also in Journal of Nervous and Mental Disease, New York, 1917, XLV, 230–236.
- SOUTHARD, E. E. The Desirability of Medical Wardens for Prisons. Being M. C. M. D. Contribution No. 192 (1917.12). Proceedings, National Conference of Social Work, Chicago, 1917, XLIV, 589-594.
- SOUTHARD, E. E. Zones of Community Effort in Mental Hygiene. Being M. C. M. D. Contribution No. 193 (1917.13). Proceedings, National Conference of Social Work, Chicago, 1917, XLIV, 405-413.

1918.

Southard, E. E., and Canavan, M. M., M.D. An Anatomical Search for Non-tuberculous Dementia Præcox. (Abstract.) Journal of Nervous and Mental Disease, New York, 1918, XLVII, 41. Also in Transactions, American Neurological Association, 1917, 242.

REMARKS.

Several autopsy collections in Massachusetts institutions have been searched for dementia præcox, and the percentages of open and closed tuberculosis determined. General figures for the whole series; dementia præcox patients are more apt to die of tuberculosis than are non-dementia præcox patients. The dementia præcox group itself, defined by various more or less rigorous criteria, has been studied more narrowly with respect to tuberculous lesions, disease type and the like.

- SOUTHARD, E. E. Remarks on Advanced Training for Social Workers. Radcliffe Quarterly, February, 1917, 35-38.
- Southard, E. E. Remarks on the Progress of the Waverley Researches in the Pathology of the Feeble-minded. Proceedings and Addresses of the Forty-second Annual Session of the American Association for the Study of the Feeble-minded, 1918, 48-59.
- Southard, E. E., and Taft, Annie E. Memoirs of the American Academy of Arts and Sciences, 1918, XIV. I. General Aspects of the Brain Anatomy of the Feebleminded (E. E. Southard). II. Clinical, Anatomical, and Brief Histological Description of Ten Cases of Feeblemindedness (Dr. Southard and Dr. Annie E. Taft). III. Neuropathological Correlations with Clinical and Psychometric Findings in Feeble-mindedness (Waverley Research Series Cases I-X) (Dr. Southard and Dr. Taft).

SUMMARY.

The entirely provisional conclusions of the epicritical review may be briefly stated as follows:—

First. — It is not impossible that the problem of matching

brain complexity with mental capacity may be solved by a much larger series of instances than is here available; but the instances of such matching as has been undertaken are somewhat convincing as to the correlations of low orders of intelligence with simple brains, and of higher orders of intelligence with more complex brains. Occasional exceptions to the rule may be explained by the finer anatomy of certain cases (Case IX); others remain less easy to explain away (Case III).

Second. — The partial orienting and microscopic examination yielded more instances of slight exudative lesions (including in some instances rod cells) than might have been à priori, except from a relatively stable institutional material like that here largely drawn upon. What the share of syphilis in this group of cases may really be is doubtful. There was one instance of feeble-mindedness very possibly due to an early focal encephalitis entailing maldevelopment of brain.

Third. — As an example of special neurological interest attaching to this study, some considerations about hydrocephalus offered bring up the question of the relation between occasional bursts of excitability and alterations of intracranial pressure with the production of hydrocephalus.

- SOUTHARD, E. E. Notes on Researches in Epilepsy at Monson. State Hospital, Massachusetts. Being Contribution No. 208 (1917.28), in Bulletin of Massachusetts Commission on Mental Diseases, 1918, II, No. 21, 10-19.
- SOUTHARD, E. E., and CANAVAN, M. M. Notes on the Relation of Tuberculosis to Dementia Præcox. Journal of Nervous and Mental Disease, 1918, XLVIII, 193-200.

SUMMARY.

On account of a recent revival of interest in the relation between tuberculosis and dementia præcox, a brief statistical inquiry was made, using data of the Massachusetts autopsy series. It was shown that dementia præcox, found in 8 per cent of 5,040 Massachusetts autopsies, was far more apt to be terminated by tuberculosis than manic-depressive psychosis, occurring in 7 per cent of the basic series. Out of 403 cases of dementia præcox 120 died of tuberculosis, and but 43 of 339 cases of

manic-depressive psychosis. Eighty-seven cases of dementia præcox showed neither death due to tuberculosis nor any anatomical feature whatever (even including adhesions in various parts of the body), which could conceivably be related with tuberculosis. Ninety-five cases of manic-depressive psychosis were equally free from tuberculosis.

The question whether these non-tuberculous cases of dementia præcox were actually victims of the disease and not subject to erroneous diagnosis was taken up in the statistical study from the Danvers symptom catalogue, from which 36 cases dead of tubercle were taken to contrast with 27 cases dying without the slightest evidence of tuberculosis whatever. Some of the most characteristic symptoms of dementia præcox were found equally distributed in the two groups and strongly represented in both, so that no major doubt can be raised as to the accuracy of the diagnosis of dementia præcox in the non-tuberculous group. For example, the fundamental symptoms of dementia and delusions of paranoid type are found equally represented in both. Nor was it found that the fundamental symptom, dementia, was more frequently shown in the fatally tuberculous cases than in the others.

An interesting question is raised by the distribution of hyper-kinetic and catatonic symptoms. Tuberculosis appears to dispose certain cases to catatonia and to hyperkinetic symptoms of a presumably psychogenic or cortical nature. Per contra, the non-tuberculous cases showed more instances of the peripheral symptom — motor restlessness — than did the tuberculous cases. Can it be true that tuberculosis inclines the dementia præcox victim more to catatonia (central hyperkinesis) and less (perhaps by processes of inhibition) to peripheral forms of hyperkinesis than do the conditions that prevail in the non-tuberculous group?

Another hypothesis raised by this statistical study is whether tuberculosis does not cause a trend of symptoms in dementia præcox over toward manic-depressive psychosis. Does not the superposition of a somatic feature like tuberculosis upon the encephalic or psychogenic picture of dementia præcox cause also a superposition of sundry features showing an alliance with those of manic-depressive psychosis? Or, put more briefly, does not tuberculosis tend to make dementia præcox look more at times like manic-depressive psychosis than dementia præcox is ordinarily likely to look?

- Southard, E. E. The Kingdom of Evil: Advantages of an Orderly Approach in Social Case Analysis. Proceedings, National Conference of Social Work, Chicago, 1918, XLV, 334–340.
- SOUTHARD, E. E. Suggestions in the Nomenclature of the Feeble-mindednesses. Mental Hygiene, Concord, N. H., 1918, II, 605-610.
- SOUTHARD, E. E. Shell Shock and After. (The Shattuck Lecture.) Boston Medical and Surgical Journal, 1918, CLXXIX, 73-93. Being Contribution No. 268 (1918.8), in Bulletin of Massachusetts Commission on Mental Diseases, III, No. 2, 1919, pp. 5-43.
- SOUTHARD, E. E. Mental Hygiene and Social Work: Notes on a Course in Social Psychiatry for Social Workers. Mental Hygiene, Concord, N. H., 1918, II, 388-406.

SUMMARY.

Some reflections have been put together on a course for social workers on social psychiatry recently given in Boston. These reflections deal largely with some distinctions between mental hygiene and social service. Mental hygiene is regarded as a branch of medicine, in a sense co-ordinate with the psychiatric branch of social work.

At first, the distinctions between mental hygiene and psychiatric social work are very clearly and definitely drawn. Particular emphasis is laid upon the individualism of the point of view of mental hygiene as against the groupism of social workers. But in the end it is pointed out that if mental hygienists are to obtain auxiliaries, such as every expert eventually obtains in the evolution of his art, these mental hygiene aides will probably be best drawn from the ranks of the social workers; they will be a kind of specialized and advanced social worker.

The point is that as the mental hygienist advances from the individual to the family and thence to the community, so the social worker, at first aiming at the community, focalizes upon the family, and finally gets a point of view concerning the individual not far from that entertained by the mental hygienist.

Despite the logical differences, then, between the point of

view of mental hygiene and that of social work (logical differences which it is well to bring out when endeavoring to get the medical point of view to some extent over into the minds of the social workers), there will be in practice little doubt that mental hygienists will find some of their most valuable aides in specially trained social workers. Just as the orthopedists will use nurses and others skilled in physical therapy, and just as the vocation workers will use persons specially trained in invalid occupation and in handicraft teaching, so the mental hygienists in war time will crave the aid of specially trained social service auxiliaries; that is, mental hygiene aides that have been given special training.

In the Boston course, largely for advanced social workers who had all had a pretty definite curriculum, stress was laid upon sundry methods of analysis of social data after their collection. Among these, methods of analysis was one which took up the question of the public, social and personal aspects of whatever problem of maladjustment was in question. Another dealt with the analysis of the patient's subjective attitude to his environment and himself, — a question of the passive voice. A third dealt with a method of analyzing data from the standpoint of the evils found in evidence, and for the purpose of orderly analysis a tentative rough classification of the kingdom of evil was given.

In view of war contingencies, brief suggestions have been made as to the desirable content of courses for psychiatric social workers of value in war time and after.

Southard, E. E. Insanity versus Mental Diseases. The Duty of the General Practitioner in Psychiatric Diagnosis. Abbreviated in Journal of American Medical Association, 1918, LXXI, 1259–1264. Published in full in the Transactions of the Section on Nervous and Mental Diseases at the Sixty-ninth Annual Session of the American Medical Association, Chicago, June, 1918. Also (Abstract) in Journal of Nervous and Mental Disease, 1919, XLIX, 371, 372.

Conclusions.

- 1. The advance of the mental hygiene movement throws more responsibilities in psychiatric diagnosis on the general practitioner.
- 2. The general practitioner should bring his specialistic knowledge of psychiatry up level with his specialistic knowledge, in ophthalmology and dermatology, for example.

- 3. Alienists are to be distinguished from psychiatrists, and forensic psychiatry ("alienistics") from practical psychiatry, in certain ways (Table 1).
- 4. There is at present great unanimity on the part of American specialists in mental disease, as indicated by the adoption of common statistical forms (American Medico-Psychological Association).
- 5. For arriving at a diagnosis of mental disease, I suggest an arbitrary order of exclusion by eleven great groups, into which I have thrown the accepted entities.
- 6. Nomenclature divergences are much more frequent than divergences on facts.
- 7. The use of Bleuler's term "schizophrenia" for dementia præcox, and of the term (in cognate use) "cyclothymia" for manic-depressive psychosis, is advocated in the line of exactitude and the ready formation of adjectives and relative terms.
- 8. The use of a new term "hypophrenia" for the various feeble-mindednesses is advocated.
- 9. The ending "osis" is in general advocated for the larger groups of mental diseases, parallel with the use of "acea" and "osa" for botanical orders.
- 10. A tentative list of "genera" under these orders is given in the text.
- SOUTHARD, E. E. The Training School of Psychiatric Social Work at Smith College; II. A Lay Reaction to Psychiatry. Mental Hygiene, Concord, N. H., 1918, II, 584, 585.
- Southard, E. E. Diagnosis per Exclusionem in Ordine: General and Psychiatric Remarks. Journal of Laboratory and Clinical Medicine, St. Louis, 1918, IV, 31-54. Also in Transactions, Association of American Physicians, Philadelphia, 1918, XXXIII, 267-301. Being Contribution (1917.53) in Bulletin of Massachusetts Commission on Mental Diseases, 1918, II, No. 3, 90-122.

SUMMARY.

1. The writer apologizes for a communication on medical logic in general when he is only a psychiatrist and but recently a pathologist. His excuse is the necessity for reasonably accurate snap diagnosis in the sifting problem of the psychoses, psychoneuroses and psychopathias, as they flow through the Psychopathic Hospital clinic in Boston.

- 2. The medical student is found destitute of the ability to define entities and symptoms. The textbooks in medicine, especially the single volume textbooks, rather tend to make the student believe that diagnosis is observation. In point of fact, diagnosis is not observation, though it requires and indeed stands or falls by accurate observation.
- 3. Da Costa and his successors have lauded so-called direct diagnosis to the skies, and Da Costa rather decried indirect diagnosis by exclusion as a tedious process. An example is cited from Da Costa which shows how relatively simple the classical diagnoses of general medicine are beside those of psychiatry.
- 4. It seemed that diagnosis by exclusion ought to be rehabilitated. An examination of recent research work in logic indicated that higher and more complex methods than those of observation had become necessary in science. For example, Cabot and Herbert French have attempted to profit by the statistical method, which again, though it requires reasonably accurate observation, is not in itself a method of observation at all. Yet Cabot's statistical frequency tables possess a certain diagnostic value. But the student is often misled by the brilliancies of so-called observational diagnosis in a clinic. Here diagnoses are often rendered on inspection by a process akin to the recognition of a fruit as an orange, or an automobile trouble as "the engine is skipping." This process is not diagnosis, it is a process of recognition that may receive a simpler term gnosis.
- 5. The offhand snap diagnostic work at the Psychopathic Hospital indicated that we were in practice relying upon the successive exclusion of certain great disease groups in a certain definite order.
- 6. A study of Royce's "Summary of Recent Researches in Logic" shows how an organized combination of theory and experience is the higher logic to which the more complicated sciences must resort. Royce himself mentioned psychiatry as a science about to climb out of the classifying era into the era of logical order, that is, of the organized combination of theory and experience. Such a dictum as that "disease is life under altered conditions" seems now childishly simple. The idea that disease is a matter of an organism plus a germ was found to be altogether too simple when in the nineties of the last century the concepts of immunology were developed.

- 7. Those departments of medicine in which the presenting symptom of Richard Cabot is of value are lucky departments. Those departments of medicine in which the indices of disease, or indicator symptoms of the elder writers are available, are also fortunate departments in comparison with psychiatry. In mental disease there are exceedingly few indicator symptoms.
- 8. Hence the need became apparent of a process of exclusion of great groups or phenomena in a certain definite order, so that nothing of large significance should evade consideration. To avoid the tediousness of exclusion, complained of by Da Costa, the phenomena of disease had to be logically grouped in certain great groups, and the process types of diagnosis in the books may be counted as six or eight, according to definition.
- 9. In the body of the paper, a special statement was made about each of these process types: inspection (regarded as not really diagnosis but as merely recognition of gnosis); expectation, a newly named but frequent method (far older than Micawber); induction, ex juvantibus, ex nocentibus (three methods in which in no very rigorous way experiment is used); and these three methods of diagnosis by comparison are successively discussed.
- 10. The ninth method, diagnosis per exclusionem in ordine, is in one sense a minor modification of the old method of diagnosis by exclusion. It is of value in departments of medicine, where there are no indicator symptoms, and where the so-called presenting symptom would merely indicate some kind of mental disease.
- 11. The general application of the method of diagnosis per exclusionem in ordine in the field of mental disease is demonstrated in the eleven groups of mental diseases into which most of the phenomena may be pragmatically cast. The groupings are not by clinical resemblances, by anatomical attack or by etiology. The distinction is a pragmatic and therapeutic one, and will naturally tend to become more and more etiologic as the causes are determined. But in the field of mental disease, causes are so apt either to be unknown or to be multiple that etiologic classification on any simple basis, such as that of the infectious diseases, is practically inconceivable.
- 12. It is hoped that other departments of medicine (where diagnosis is raised above the level of mere recognition, and where there are few or no pathognomonic or indicator symptoms), will find it to their advantage to set up a method of diagnosis per

exclusionem in ordine, the great groups or orders being always determined on a pragmatic basis. In the body of the paper are given the general designations of the ten great groups of mental diseases, with the eleventh residual group.

- Southard, E. E. The Empathic Index in the Diagnosis of Mental Diseases. Journal of Abnormal Psychology, Boston, 1918, XIII, 199-214.
- CANAVAN, M. M., and SOUTHARD, E. E. Microlienia and Other Observations on the Spleen in Psychopathic Subjects. Being M. C. M. D. Contribution No. 236 (1917.56). Bulletin of Massachusetts Commission on Mental Diseases, 1918, II, 136-142.

SUMMARY.

- 1. Microlienia is frequent in the bodies of psychotic subjects.
- 2. Possibly this small spleen is an index of general hypolymphatism in the body. At all events, it is correlated with these mucous membranes and with a small amount of lymph node tissue in a large number of instances. The "psychotic" spleen-liver index was 112 to 1,362, as against normal, 171 to 1,500.
- 3. Chronic lesions are frequent, for example, 15 per cent of lesions in the capsule; 28 per cent of lesions in the tunica albuginea; 12 per cent of thickenings in the trabeculæ; 67 per cent of plasma cells in the pulp cords; and 86 per cent of thickenings in the arterial twigs.
- 4. The high degree, 67 per cent, of plasma cells in the pulp cords seems of importance when it is considered that some authors feel that plasma cells in the spleen have pathological significance.
- 5. A similar study of kidney lesions in the same series, published in 1914, showed but 42 per cent of plasma cells in the kidney.
- 6. As for the malpighian bodies, considerable variations in the number of rows of cells was found therein, 3 to 30.
- 7. Whether this hypolienia has anything to do with reactions of psychotic subjects to infection must remain doubtful.
- 8. It would appear that further studies of the hemopoietic system ought to be made in the psychoses and ought to be

supported by accurate clinical studies of the peripheral blood intra vitam.

- 9. Eighteen spleens of general paretics were carefully studied for spirochetosis; no spirochetes were found.
- SOUTHARD, E. E. Discussion on Illness in Industry Its Cost and Prevention. Transactions, American Institute of Mining Engineers, 1918, LIX, 678-684.

1918-19.

SOUTHARD, E. E. A Key to the Practical Grouping of Mental Diseases. Being M. C. M. D. Contribution No. 196 (1917.16). Journal of Nervous and Mental Disease, 1918, XLVII, 1-19. Also in Bulletin of Massachusetts Commission on Mental Diseases, Boston, 1918-19, II, No. 1, 5-24.

SUMMARY AND CONCLUSIONS.

I have here presented not so much a classification as a key to the grouping of mental diseases. The key has been worked out to the extent of ten well-defined groups and an eleventh residual group. These groups correspond to the groups of, e.g., the Rosacew or Leguminosw of botany, and do not correspond to the genera and species of those orders. Some hint is given of the generic and specific distinctions of mental disease that might correspond to the genera and species of botany, provided that there were any practical need for a quasi-botanical or zo-ological genus-species distinction in mental diseases.

The incentive to this grouping has been practical. No endeavor was made on the library table to construct a hortus siccus of mental diseases. On the contrary, this key is the product of several years of work in the Psychopathic Hospital in Boston, where the task of reasonably accurate diagnosis by an everchanging staff of psychiatrists in training was the desideratum. I do not accordingly suggest this key as something to replace the methods of the expert in arriving at a conclusion concerning psychiatric diagnosis. I do offer it, however, as a guide for the tyro and the psychiatrist in training. It is not an outline giving an order of examination. It is a scheme for summarizing and evaluating results after the physical, mental and historical data are collected. The plan is eliminative, but is subject to this reservation: if one arrives in the chosen sequence of analysis at

a plausible or even a correct group diagnosis, one is not thereby absolved from continuing the process of analysis. All data bearing on any of the groups must be considered. Diseases may be "hybrid," though practically one is almost never in doubt as to the group under which to subsume a case. Theoretically, one may be, for example, both epileptic and alcoholic; practically one is either an epileptic alcoholic or an alcoholic epileptic. guide to the grouping here is a pragmatic one, and depends upon the institution or the special treatment to which the supposed victim of epilepsy and alcoholism must gravitate. I must especially emphasize that the groups and the group names do not correspond to nosological entities and entity names. The placing of a case in one of these eleven groups is not psychiatric diagnosis in the entitative sense. Accordingly, this grouping does not run into collision with any previous endeavor to classify the genera and species of mental disease, such, for example, as the genera and species in the majority of classifications quoted in Hosack.1

I would insist, further, that the group headings given are not special enough to constitute sufficient diagnosis for a classification of use in the statistics of institutions for the insane. The plan is not so much an excursion in nosology as an essay in the technique of psychiatric diagnosis for the tyro. The plan gives hints for a method of arriving at an eventual diagnosis: it does not prescribe the names of diseases. Again, the plan is not an etiological plan, although recent advances in psychiatric etiology have been such that many of the practical groups are actually etiological groups.

It is possible that the sequence has been unduly telescoped. It is possible that there should be a traumatic and an arteriosclerotic group. I have placed both of these groups in the encephalopathic or coarse brain, or "neurologist's" group, feeling that I do the diagnostic tyro a service by pulling the encephalotraumatic psychoses far apart from the traumatic psychoses on the one hand, and the arteriosclerotic psychoses far apart from the senile psychoses on the other hand.

Lastly, I would insist once more that the plan is one born of Psychopathic Hospital experience and bred in the first place for the inexpert. It is a key to study and not an analytical classi-

¹ Hosack, David, "A System of Practical Nosology: to which is prefixed A Synopsis of the Systems of Sauvages, Linnæus, Vogel, Sagar, Macbride, Cullen, Darwin, Crichton, Pinel, Parr, Swediaur, Young and Good, with References to the Best Authors on each Disease," 1st edition, 1819, 2d edition, 1821, New York.

fication with any pretense to finality. Elements in the sequence can be destroyed and new elements inserted. Indeed, such processes of extrapolation and interpolation must needs occur in the progress of practical diagnosis. Whatever novelty the plan may have lodges in the sequential character of the analysis of data already collected, and not in the completeness or ultimacy of the groups. The sequential plan of analysis is of course as old as the diagnostic hills. It is superior, however, to the type-matching method of diagnosis in vogue with many tyros, who very often come to their superiors with the plaint that the data in a given case fit the book descriptions of half a dozen diseases. A set sequential analysis of collected data must be superior to a hit-or-miss type-matching of entities.

SOUTHARD, E. E. Recent American Classifications of Mental Diseases. American Journal of Insanity, Baltimore, 1918–19, LXXV, 331–349.

SUMMARY.

We thus arrive at the following general considerations concerning the recent American classifications in psychiatry:—

- 1. There is an extraordinary unanimity on the part of American psychiatrists as to the constituents of psychiatric nosology, and this despite a number of nomenclatural divergences.
- 2. The classification proposed by the American Medico-Psychological Association and adopted by the United States government for practical war work is a suitable reference table for statistical purposes of the major groups and clinical types of mental disease.
 - 3. The classification may be somewhat inadequate for the purpose of general and psychopathic hospital practice, but a slight revamping might solve this difficulty.
 - 4. The American Medico-Psychological Association's classification appears to follow an etiological ordering borrowed ultimately from reputable German sources, and this etiological ordering is a good one if a certain etiological viewpoint is in mind.
 - 5. The question is raised, Whether it would not be better to order the groups and types of mental disease in a pragmatic rather than a theoretical order, that is, in an order having therapy in mind rather than an order having etiology in mind?
 - 6. The writer proposes such a pragmatic order of certain great groups or orders of mental disease, corresponding with the botanical or zo-ological orders.

- 7. The writer finds that the 22 American Medico-Psychological Association's groups might well be compressed for practical purposes of diagnosis into 11 groups. He finds that the clinical types subordinated to the great groups of the American Medico-Psychological Association's classification correspond more or less accurately to the genera of a botanical or zo-ological classification, and proposes that in practice these sub-groups be considered in order, in general accordance with the principles of botanical or zo-ological taxonomies.
- 8. This question of how to use a classification may be defined as the question of a key to the grouping of diseases. The key question is entirely independent of the classification or reference-table of entities and entity groups, and both the key question and the classification-list question are independent of questions of nomenclature and terminology. Moreover, the writer would insist that the logical process of diagnosis per exclusionem in ordine here developed has nothing whatever to do with the order in which data can or should be collected.

1919.

- SOUTHARD, E. E. Shell Shock and Other Neuropsychiatric Problems presented in 589 Case Histories from the War Literature, 1914–18. With a Bibliography by Norman Fenton, S.B., A.M., and an Introduction by Charles K. Mills, M.D., LL.D. W. M. Leonard, Boston, 1919.
- SOUTHARD, E. E. The Functions of a Psychopathic Hospital. Canadian Journal of Mental Hygiene, Toronto, Ont., 1919, I, 4-19.
- SOUTHARD, E. E. Prothymia: Note on the Moral Concept in Xenophon's "Cyropedia." Contributions of Medical and Biological Research, Osler, 1919, II, 786-795. Also (Abstract) in Journal of Nervous and Mental Disease, 1919, I, 63.

Conclusions.

- 1. The material in Xenophon's "Cyropedia" indicates the probable great value of a historical study of the morale-concept,—a study that might enliven the ethics of the day.
 - 2. The itemizing of morale-measures found in the "Cyropedia"

indicates the probable success of a behavioristic version of a large part of morale as the Greeks saw it.

- 3. In particular, the roots of most of the words employed in Xenophon's morale-description are roots having to do with movement and speed (rather than with mere strength statistically taken), and having little to do with mere feelings.
- 4. In particular, also, many of the words indicate the thoracic seat of the motions engaged (e.g., the early localization of $\theta\nu\mu\delta$ s, animus, strong feeling and passion, derived probably from $\theta\delta\omega$, rush) rather than a seat in the head or in the muscular system at large; i.e., morale of Xenophon's description is more a matter of heart than of brawn or of head, but "heart" gets a behavioristic accounting rather than one in terms of felt emotion.
- 5. The morale of Xenophon's day, or at least the morale of his account in the "Cyropedia," is plainly far from a complete story of morale in the modern sense, especially the morale developments in armies and nations subsequent to the French Revolution.
- 6. The term *prothymia* is indicated for the morale situation as depicted by Xenophon. This term has several advantages:—
 - (a) The root is a leading term in Xenophon's list.
- (b) The root word $\theta\nu\mu\delta\varsigma$ has deep-lying hints of motion in it, as well as general usage in compounds suggesting "heart" in a figurative sense; and the prefix $\pi\rho o$ has suitable intimations of pushing forward in space.
- (c) Modern psychiatry has come to use the theme thymia in many compounds describing variants of emotion (e.g., hyperthymia, parathymia).
- (d) The term prothymia is euphonious and readily suggests variants, e.g., prothymic (adjective to be used of morale procedures) and prothymics (substantive for the art of morale, or for our accumulation of facts concerning morale).
- SOUTHARD, E. E. The Individual versus the Family as a Unit of Interest in Social Work. Mental Hygiene, Concord, N. H., 1919, III, 436-444. Also in Proceedings, National Conference of Social Work, 1919, LXVI, 582-587.
- SOUTHARD, E. E. The Range of the General Practitioner in Psychiatric Diagnosis. Journal of American Medical Association, Chicago, 1919, LXXIII, 1253-1256.

SUMMARY.

Psychiatry has become almost more popular with non-medical mental hygienists than the medical profession. Of course, the relations that are ultimately to stand between clinical neurology and psychiatry are not entirely clear. But the relations between psychiatry and the general practice of medicine are disturbed by special difficulties, e.g., phobias on the part of the general practitioner concerning nomenclature and concerning his own supposed ignorance of psychiatry.

A frontal attack is proposed on the general practitioner, in addition to the flank attacks considered desirable in the past, for his proper postgraduate education.

Psychiatry is more a synthetic art than is clinical neurology, now predominantly analytic. But, being synthetic, psychiatry has much in common with general medicine. General medicine, psychiatry, and (to a certain point) obstetrics treat the patient as an *individual*, whereas the majority of the specialties treat the patient (in scholastic phrase) as a *dividual*.

The body of the text contains material illustrative of some inadequacies of the general practitioner re psychiatry. Many of these are easily reparable.

SOUTHARD, E. E. Non-dementia Non-præcox; A Note on the Advantages to Mental Hygiene of extirpating a Term. (Abstract.) Journal of Nervous and Mental Disease, New York, 1919, I, 251, 252.

Note.

Dr. E. E. Southard spoke in regard to the unsuitableness of the term "dementia præcox" furnished by Kraepelin, upon the badness of which term all are agreed. Some international committee on psychiatric terminology should be formed to select desirable psychiatrical terms.

Neither dementia nor præcox are indispensable features of what is called dementia præcox. The use of the term brings unhappiness to patients and much wrong results from its use. Catatonia was first described in 1858. In 1896 Kraepelin used the term dementia præcox to include several types of mental disease. In 1913 he evolved thirteen types, containing nine types of dementia præcox and four of paraphrenia, and designated these thirteen types as endogenous deterioration. Bleuler

later suggested that schizophrenia should be used instead of the undesirable term dementia præcox. This conveys the idea most important to this disease, the splitting of the personality, and it forms a good basis for various derivations. It does not commit one to any one notion of the mechanism involved nor of the nature of the process.

Southard, E. E. The Activities of the War Work Committee of the National Society for Mental Hygiene. (Abstract.) Journal of Nervous and Mental Disease, New York, 1919, XLIX, 44, 45.

NOTE.

Dr. E. E. Southard was absent from the meeting, and the secretary of the society read a few notes from him on these activities, in which he outlined the early organization of the War Work Committee by Dr. Bailey, now Lieutenant-Colonel, and Dr. Salmon, now Major, aiming at both unity of action and speed in the mobilization of the neuro-psychiatric and psychological resources of the country. He mentioned the work of the psychologists at the cantonments in the examination of the soldiers and officers, and in the testing for defectives, and also the work of the neuro-psychiatric units in the army. The results of the examinations of the latter group had resulted by January, 1918, in the elimination of 8,000 men from active military duty as unfits. Dr. Southard emphasized the fact that this country is the first to attempt elimination of nervously unfit from the army activities by examinations for evidences of such inadequacy. spoke of the great need for men trained in this field, noting that over 300 men had already been commissioned in the army for this work, New York and Massachusetts leading all other States in the number, proportionate and absolute, of men to enlist from the State institutions. He said that there was also a great need of male nurses for the work, reconstruction aides, social service workers, a necessity for provisions for the care of the families of men entering the service, and similar problems to which the War Work Committee is now devoting its energy and time.

SOUTHARD, E. E. Sigmund Freud, Pessimist. Journal of Abnormal Psychology, 1919, XIV, 197-216. Also (Abstract) in Journal of Nervous and Mental Disease, New York, 1919, I, 162, 163.

Southard, E. E. The Genera in Certain Great Groups or Orders of Mental Disease. Archives, Neurology and Psychiatry, 1919, I, 95-112.

SUMMARY.

In this paper I have tried to amplify the key to the practical grouping of mental diseases presented to the American Neurological Association in 1917. I have amplified it by proposing certain genera comprised under each of the eleven major groups of mental diseases. These genera have been placed in the sequence supposed to be the pragmatic sequence in which the inexpert diagnostician should seek to exclude successively the various genera; in short, just as the key to the practical grouping of mental diseases dealt in a certain sequence with eleven major groups, so here the diagnostician is given an idea as to the proper method of considering one after another the genera comprised in each great group. No endeavor has been made to revamp or especially modify the ideas of psychiatrists as to what psychotic entities exist. Finality cannot be hoped for either theoretically or practically. The principle of diagnosis per exclusionem in ordine is the special principle insisted on. It is applicable to any diagnostic problem after the data of observation are collected. True diagnosis can only take place after sufficient data are collected, and efforts to make diagnoses early in the stage of collecting data are apt to result in prejudice.

The writer earnestly hopes for critique of his propositions. Such critique he hopes will be separated into —

- (a) Critique of the general principle of diagnosis per exclusionem in ordine.
 - (b) Critique of the genera chosen for the different groups.
 - (c) Critique of nomenclature.

But judging from the world's experience in the past, it is unlikely that many persons will be able to distinguish nomenclature from the objects named and the method of using a classification from the classification itself. Herein some nomenclatural suggestions are made, but they have nothing to do with the main line of argument. Herein a certain classification is adopted, but there is absolutely no pretence to originality therein. The writer's main emphasis is on the pragmatic principle of diagnosis, namely, the principle of diagnosis by exclusion in order, which principle will prove useful or useless without regard to the classification which it endeavors to exploit or the nomenclature which it uses by the way.

Unpublished.

- SOUTHARD, E. E. Artistic Experience: Its Relation to Other Forms of Ecstasy.¹
- SOUTHARD, E. E. General Psychopathology. Psychological Bulletin, 1919, XVI, 187-199.
- Southard, E. E., Canavan, M. M., and Thom, Douglas A. The First Thousand Autopsies of the Pathological Service of the Massachusetts Commission on Mental Diseases, 1914–19. Transactions, American Medico-Psychological Association, 1919. (Sent to American Journal of Insanity, March, 1920.)
- Southard, E. E. An Attempt at an Orderly Grouping of the Feeble-mindednesses (Hypophrenias) for Clinical Diagnosis.²
- SOUTHARD, E. E. Cross-sections of Mental Hygiene, 1844, 1869, 1894. Presidential Address at the Seventy-fifth Annual Meeting of the American Medico-Psychological Association, Philadelphia, June 18 to 20, 1919. American Journal of Insanity, 1919, LXXVI, 91-111.

Address.

My task was to speak of an anniversary. I have adopted the device of cross-sectioning the years, no doubt at all too brief intervals in so long a history, and beyond question, choosing facts in quite too random a fashion. Yet the variety and the heterogeneity of the facts and the arbitrariness of the trisection allow, with all the greater certainty, a number of conclusions and comments. These I shall set forth with a baldness quite unjustifiable save by the brevity of our time.

1. The American Medico-Psychological Association, now over 900 members strong and representing a large majority of the United States and the Canadian provinces, being the oldest national medical association in continuous existence (so far as we are aware) on the continent, has a history of seventy-five years, cast in a time of almost unprecedented interest in the world's history to date.

¹ Read in Charaka Club, New York, Nov. 19, 1919.

² Read before Association for Study of the Feeble-minded, Chicago, June 11, 1919.

- 2. During these seventy-five years an extraordinary process of public enlightenment concerning mental disease has gone forward, pari passu with general progress in education and the more material and engineering sides of economics.
- 3. Put in a phrase, this progress has been to a deeper and more pragmatic hygiene in all matters pertaining to the mind. Perhaps the most eminent of our earlier members was Dr. Isaac Ray, the author of a work on "Mental Hygiene," in which there was, from our present viewpoint, much elaboration of the obvious, and in which there was naturally very little of the modern social conception. Yet Ray himself was one of the founders of the Social Science Association, and distinguished himself, as Dr. Charles K. Mills this morning said, by writing an excellent work on the "Jurisprudence of Insanity."
- 4. Just as Ray's "Mental Hygiene" was largely devoted to a consideration of individual psychiatry, and took up the psychiatry of the person as such and as affected by various conditions of the society in which that person's life befell, so, on the other hand, Ray's "Jurisprudence of Insanity" dealt with what we would now call forensic psychiatry, that is, with public or governmental aspects of mental disease. Accordingly, the whole intermediate realm of social psychiatry proper, that is, of psychiatry that deals neither with the individual person as such nor with his legal or institutional relations, got no formulation in the early years of our association's life.
- 5. As Isaac Ray typifies our membership 1844-69, so perhaps Edward Cowles typifies the membership in the second quarter-century of our association's existence. Cowles stood and thank God still stands for a profounder insight into the nature and causes of mental disease and defect, and no doubt to him is greatly due the impetus to the establishment of laboratories in our institutions. This is no place to eulogize the living. But the third quarter-century, now coming to a close, could not have been so greatly distinguished by the laboratories and by the exercise of what has been called the laboratory habit of mind, had it not been for Cowles. Nor is this a personal view of my own. A dozen of the best men amongst our psychiatrists have said as much to me in the last few years.
- 6. Perspective interferes overmuch with our estimate of a typical personality for the third quarter-century. I myself believe that no greater power to change our minds about the problems of psychiatry has been at work in the interior of the psychiatric

profession in America than the personality of Adolf Meyer. If he will pardon me the phrase, I shall designate him as a ferment, an enzyme, a catalyzer. I do not know that we could abide two of him. But in our present status we must be glad there was one of him. No American theorist in psychiatry of these and the immediately succeeding decades but is compelled either to agree or else—a thing of equal importance—most powerfully to disagree with him. And who shall say that anybody is abler to get truth and reality out of disagreement and error than psychiatrists?

- 7. The outstanding development in the latter years, and especially in the last quarter-century of the association's history, has been, to my mind, the development of social psychiatry, than which it might be hard to name a more important feature of the face of the world to-day. Social psychiatry, even were we to include (what practically is not included, namely) public psychiatry within its conception, is far from the whole of mental hygiene. For mental hygiene includes also the far more difficult and intriguing topic of the psychiatry of the individual, as related to himself and his organs and processes.
- 8. Personally I hold, and I think every physician and especially every psychiatrist must hold, that the individual is not only the unit of the physician's interest, but also (following Herbert Spencer) the unit of the sociologist's interest. This we ought to maintain, I think, against the supposed sociological improvement introduced by Schäffle, namely, that the family is the social unit. Accordingly, I hold that the foundation of social psychiatry (as also of public psychiatry) is the psychiatry of the individual.
- 9. Now it was just at the outset of our third quarter-century that Josiah Royce made his theoretical contributions to the conception of the social consciousness (1894–95). From that atmosphere developed in the work of Richard Cabot the idea of medical social work. Mark you that this idea was far more than a mere addition of two ideas, namely, the idea medicine and the idea social work, but was a productive combination of these ideas, an actual novelty. It was then only a step to the development of psychiatric social work in Massachusetts, 1912, a step stated by Cabot himself (at the recent meeting of the National Conference for Social Work) to be the greatest innovation in medical social work since its foundation.
- 10. From Bakunin to Lenin is a half century. What has the world to say of anarchism and Bolshevism? Certainly these

are no new things. Perhaps neither Bakunin nor Lenin is a topic for alienists of the old medicolegal group. These world leaders are not on the minute to be interned as insane! But does any man of us here believe that the psychiatric viewpoint could fail to throw light on Bakunin and on Lenin? Alone amongst the specialties of medicine, psychiatry has for its daily task the consideration of the entire individual. The rest of the branches of medicine, even neurology, appear to remain much too analytic in their view of a man. Psychiatry alone uses the daily logical apparatus of the synthesizer.

- 11. Is mental hygiene ready for the problem of Bakunin and Lenin? Alas, No! We have our "Varieties of Religious Experience," but no James has arisen to depict, on the basis of the extremest cases, the varieties of political experience. In fact, the delineator of Lincoln or of Roosevelt as in any sense psychopathic might well bring down upon his head far more partisan fury than one who should discover the queerest traits and episodes in religious heroes. We deal with Aqua Regia, with Damascus blades, in our psychiatric laboratories and armories. "Divide to conquer" is a necessary precaution. We must teach the world, what we as physicians have so recently learned, namely, that to be crazy is to be one of scores of things. To describe Lincoln as a cyclothymic with attacks of depression, or Roosevelt as constitutionally hyperkinetic (always supposing these to be true designations), should be no more impolite or less objective than to think of Bakunin or Lenin as paranoic personalities. Crazy? No! But, cyclothymic or paranoic, certainly!
- 12. Insanity is mental disease, but not all of it or rather of them. Alienists are psychiatrists, but not all, or, in the long run, the majority of psychiatrists. "Alienistics," as we may call the doctrine of medicolegal insanity, is not the whole of psychiatry. But, above all, psychiatry must be conceived to include the minor psychoses, the smallest diseases and the minutest defects of the mind, as well as the frank psychoses and the obvious feeble-mindednesses. The psychiatry of temperament is an art that might fling itself very far. Mr. Wilson, I believe, spoke of some members of his cabinet as temperamental. As a cat may look at a king (time and weather permitting), so I suppose a psychiatrist might look at a cabinet officer, at least in one of his temperamental phases.
- 13. We passed from the age of Darwin to the age of Pasteur, to the age of Metchnikoff and of Ehrlich; we lived through the

beginnings of systematic psychiatry in the period of Griesinger; we witnessed the first clarifications of mental disease function in the period of Charcot; and we have just concluded a war whose psychiatric achievements (from the deepest theoretical side) trace back to Charcot, flowering to my own mind in Babinski. In America, outside institutions, there had been a dearth of great theorists after Benjamin Rush. But the basic ideas of Weir Mitchell were no doubt being laid down in the war time of our first quarter-century only to effloresce in the second period. The work of Charles K. Mills stands out for me as of the greatest theoretical importance in American work in that second period. I think of Donaldson as a great force in our third period, if we are looking outside institutional ranks.

14. But it is clear that the American idea, mental hygiene, must have grown in philosophic circles too. I think first of the great Emersonian period, with its grotesque parody called Eddyism or Christian Science. Then I think of the laying down of the idea of pragmatism by Charles Peirce, the great and little known central figure of American thought. And then I think of the man William James, who put pragmatism across the American scene, but added thereto what I may call the psychiatric touch, and really typifies all that is best in American thought. Emerson, Peirce, James — these are three American names to conjure by, and they are deeply responsible for the spiritual, the logical and the practical factors in the whole of mental hygiene. With their spirit, illumination and dynamism we shall face the terrible analyses of the present hour — the rights and interests of the individual as against society, and of society as against the individual — with full confidence that synthesis will follow analysis, and the task of Humpty-Dumpty solved at last.

15. Do you not agree with me that in all the pot-pourri of the years this great problem of the place of the individual stands out? That American thought, transilluminated as always by the softened European lights, contains within itself immortal fundaments of the mental hygiene of nation, race and person? And may we not rejoice, as psychiatrists, that we, if any, are to be equipped by education, training and experience better than perhaps any other men to see through the apparent terrors of anarchism, of violence, of destructiveness, of paranoia, whether these tendencies are shown in capitalists or in labor leaders, in universities or in tenements, in Congress or under deserted culverts? It is in one sense all a matter of the One and the Many.

Psychiatrists must carry their analytic powers, their ingrained optimism and their tried strength of purpose into not merely the narrow circles of frank disease, but, like Séguin of old, into education; like William James, into the sphere of morals; like Isaac Ray, into jurisprudence; and above all, into economics and industry. I salute the coming years as high years for psychiatrists!

Southard, E. E., and Pressey, S. L., Ph.D. A Review of Industrial Accident Board Cases examined at the Psychopathic Hospital. Proceedings, International Industrial Accident Boards and Commissions, 1917, Washington, 1919, 159–170; United States Bureau of Labor Statistics, March, 1919. No. 248.

SUMMARY.

To sum up, then, I have mentioned a surprising number of points of contact made of recent years by psychiatry and psychology with industrial problems.

I have presented a special report of Dr. S. L. Pressey showing the reliability of the psychological tests in industrial accident cases, and Dr. Pressey has included in his report a number of special instances in which the working of these tests may be seen.

A few instances from our review have been given, showing the decided bearing which psychiatric diagnosis may have upon the findings for claimant or insurer, as the case may be, and on the amount of compensation when rendered.

A number of pitfalls of the work have been enumerated. I have laid the greatest stress upon psychometric ("mental test") work because of its quantitative nature and its relatively recent developments. In the industrial accident board group, from the psychiatric point of view, I find cases of syphilis of the nervous system, of feeble-mindedness, epilepsy, alcoholism, focal brain disease, dementia præcox, and manic-depressive psychosis, to say nothing of the traumatic variety of neuropsychosis and the number of odd cases difficult to classify.

I think there is no doubt that just as this work will benefit those physicians and psychiatrists who are going to deal with the shell shock wrecks of this war, so the entire work of industrial accident boards throughout the world is going to prove of most concrete value in the whole field of after-war re-education. SOUTHARD, E. E. The Mental Hygiene of Industry — A Movement that Particularly Concerns Employment Managers, and Industrial Management. The Engineering Foundation, Reprint Series No. 1, February, 1920, LIX, 100-106. Also in Mental Hygiene, 1920, IV, 43-64.

SUMMARY AND CONCLUSIONS.

- 1. The general object of this paper is to set forth the existence and present rate of progress of a movement for the mental hygiene of industry.
- 2. This term mental hygiene is coming into general use to cover the expert activities of psychiatrists (i.e., medical men interested in the problems of mental disease, including the mildest forms of temperamental deviation), psychologists (i.e., scientific and theoretical experts, who are now turning attention to methods of mental testing designed to improve and replace the hit-or-miss methods of the past), and various non-professional or semi-professional aides (such as social workers with special experience in character-handicap cases).
- 3. The recent improvements in employment management and all activities dealing with industrial personnel show that industry is ready for the new movement, and employment managers everywhere are displaying the keenest interest in the new ideas.
- 4. Meanwhile the war-time results of the experts in mental hygiene enumerated in paragraph 2 have given practical demonstration of the value of mental hygiene in a business partaking largely of the nature of industry, namely, the business of war.
- 5. The earlier literature of industry conclusively shows that the "mental hygiene of industry" is nothing new in its essence (witness, many older references to the *human element*, etc.), but to-day's contribution is the organization of older interests for a systematic attack on industrial personnel problems.
- 6. The keynote of this systematic attack on industrial personnel problems by means of mental hygienic data and methods is the pooling and co-operative combination of expert engineering interests and expert medical and psychological and sociological interests; in brief, the invoking by the expert in industrial personnel of the aid of all available experts in personality, to the study of which the whole personnel problem must reduce.
- 7. The interested personnel man or lay reader is implored not to take sides for one or other claims or counterclaims by medical men, psychologists and others concerning the virtues of special

methods. The topic is growing and a little controversial, but on the whole, the quarrels about method are superficial and the unanimity of experts extraordinary (no doubt the trials of the war served to mature and season the experts on all sides).

- 8. Another warning. Every time the world has tried to measure things more accurately many foolish persons have risen to protest. Not a few medical men and psychologists will rise to say over the same formula against the mental hygiene of industry. It is to be hoped that, at this late date of the world's history, we can jump this zone of senseless protest against what must inevitably succeed, namely, a program of more expert study of anything whatever, including the human personality, wherever at work.
- 9. The movement for a mental hygiene of industry is neither an outgrowth of the efficiency movement (Taylorism and the like) nor an outgrowth of the workmen's welfare movement (economic interest in shorter hours, better working conditions and the like), though mental hygiene does effectively combine "efficiency" and "welfare" (as it were, F. W. Taylor and Jane Addams).
- 10. On the contrary, a stream of independent developments in our knowledge of personality (medical, psychological, illustrated, for example, in the kind of insight into human nature displayed by William James) is now pouring itself into a branch of engineering personnel management which has been running parallel for some time. Let us think of the movement in the terms, not of F. W. Taylor nor of Jane Addams, but in terms of William James.
- 11. The text contains sundry definitions and general statements on these lines. Future papers will amplify the account.
- 12. Perhaps the argument for a mental hygiene of industry may be put in a nutshell form as a question: Why should not industrial managers seek the aid of (a) those who can measure at least a few of our mental capacities and have shown their abilities in the war work; of (b) those who are the best specialists we yet have in temperament and the best experts in grievances yet developed; and of (c) others less professionally trained who are capable of tracing out or helping to trace out the actual situation of, e.g., labor "turn-over" as shown in the individual instance?
- 13. In short, why not help to push on the movement for individualism in industry that everyone sees coming and ardently hopes for?

Southard, E. E., and Solomon, H. C. Morbi Neurales. An Attempt to apply a Key Principle to the Differentiation of the Major Groups. Archives, Neurology and Psychiatry, 1920, III, 219-229.

SUMMARY.

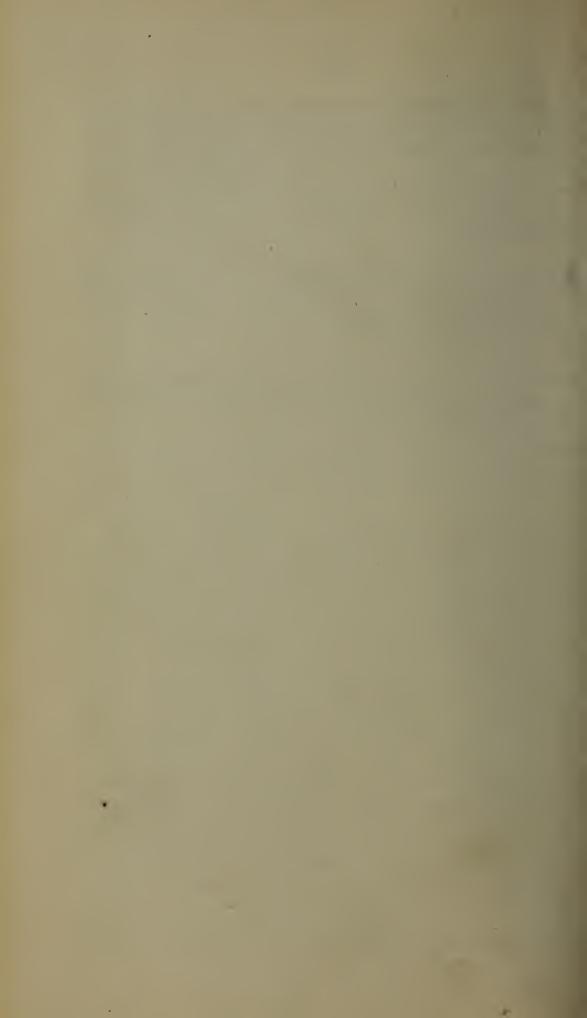
The method of diagnosis by orderly exclusion, already proposed for use in the diagnosis of mental diseases, is probably of equal value in the field of nervous diseases. The writers have endeavored to gather the main types of nervous disease into a comparatively small number of groups for successive consideration by the tyro, or even by the expert, in diagnostic elimination. Experts may prefer a different order from the one proposed, but it is unlikely that any neurologist fails to use, consciously or unconsciously, some form of orderly diagnosis.

Yet the student is quite likely to be taught that the best procedure is to pick out some striking symptom in a case under consideration, and to follow that symptom back to textbook models for a suggestion as to the entity involved. He then endeavors to match the data of the case in hand with the possibilities laid down in the textbook.

We think that it is much more desirable to take the general situation in the body at large into account, and to include, if possible, first, the hypothesis of an infectious origin for the symptoms. Secondly, we try to exclude, if possible, the effects of coarse and otherwise destructive lesions of the nervous system (historrhexes), namely, in general, such conditions as show no signs of infection, but exhibit reflex disorders and signs of heightened intracranial pressure and the like, suggestive of focal lesion. Thirdly, we come to the hypothesis of the existence of one or other of those classic degenerations with which the neurologist is familiar. If infection, historrhexis and classic degenerations can be excluded, we then proceed, fourthly, to the hypothesis of some kind of imbalance, perhaps metabolic or endocrine or sympathetic. If the diagnosis cannot be made on these lines, possibly the condition belongs in some miscellaneous and otherwise undefined or highly specialized group.

Even when the disease seems to be limited to a peripheral nerve, we consider that then the successive hypotheses of (1) infection, (2) historrhexis, (3) specialized neuronatrophy, (4) imbalance, can be preferably considered in that order. We think that by the pursuit of some such method as this the neurologist can bring his work better into line with that of general medicine. The method is, moreover, a very pragmatic method, since lines of treatment are specially indicated for the different great groups of disorders. But in so difficult a field we do not wish to dogmatize, and shall be content if our communication arouses interest in the application of the key or order principle to the diagnosis of nervous diseases.

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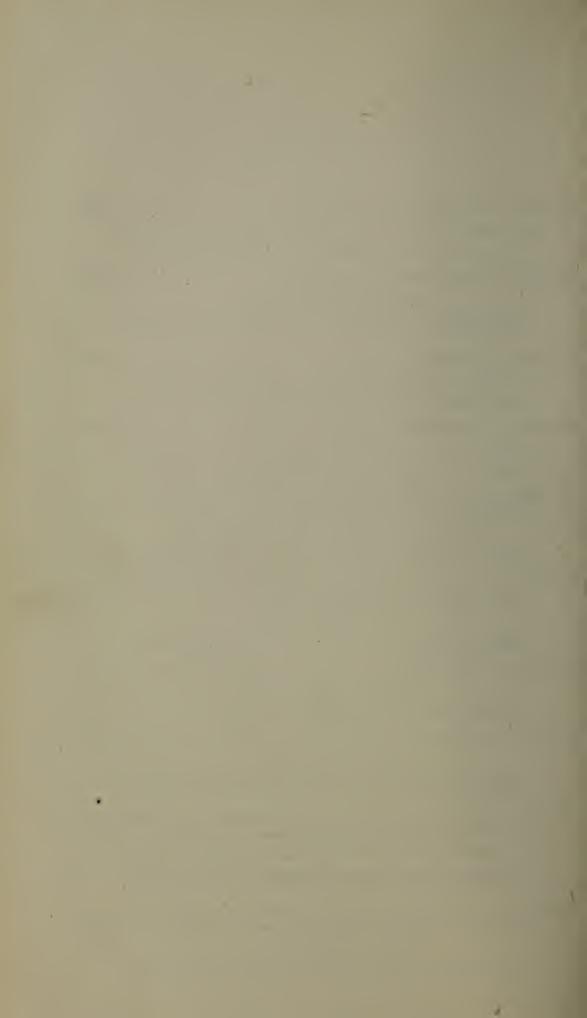
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WALTER E. FERNALD, M.D. GEORGE M. KLINE, M.D.

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SELECTED MEDICAL AND SCIENTIFIC STUDIES.

THE DIAGNOSIS OF "WAR PSYCHOSES."

By George E. McPherson, M.D., Medfield, Mass., Major, M. C., U. S. A.,

AND

LESLIE B. HOHMAN, A.B., M.D., BALTIMORE, LIEUTENANT, M. C., U. S. A.

Shortly after the beginning of the war it was rumored that a number of anomalous psychoses were being observed among the soldiers; that is, patients in whom all the symptomatology previously would have led the psychiatrist to give a gloomy prognosis, but who recovered spontaneously without apparent residual. This group was understood to contain only psychogenetically determined psychoses, and did not include any cases which might be regarded as organic. Until the fall of 1918 no opportunity was offered us to see anything of this war result with the exception of a few sporadic cases.

Two of these, however, were calculated to increase one's interest in the type of clinical material to be seen. The first case was that of a psychosis in a sergeant who had led an unusually sheltered life, with no adequate notion of sex adaptation. had had no opportunity frankly to face problems because his entire family life had been dominated by the Christian Science activities of his mother. The psychotic episode followed pneu-After an initial period of delirium, the disorientation disappeared completely, leaving the patient with ideas that electricity was being placed in his bed; that he had been made into a monkey; that he had been contaminated with "filth." and that "purity first" would save the world. He complained of a sense of body alteration. Nocturnal enuresis persisted for some time, and was regarded by the patient as a fluid withdrawn from him by the influence of "some woman." All his utterances gave evidence of profound, instinctive disorientation in the face of clear, general orientation. Although the soldier had not seen overseas service, the case suggested what might be expected if men were suddenly transplanted from a sheltered, protected life, with its relatively simple environment, to the hurly-burly of active service, with all its difficulties of adaptation. After his recovery he gave an account of the horror with which he had viewed the facts and manifestations of sexual life as told in the barracks.

A second patient — an officer who had been discharged with a diagnosis of paranoia — when first seen presented an elaborate system of persecutory delusions with retrospective falsifications. The patient had a long history of difficulties and to each he had reacted with gastric hypochondriasis. After a period of intense homesickness overseas, he was notified that he was to be sent The fear of active service, although existing some time, suddenly became acute. His inability to face the situation frankly resulted in his acute psychotic episode. He justified his fear by regarding himself as persecuted. Interestingly enough, the gastric complaints disappeared completely throughout the period of his psychosis, only to reappear promptly when recovery from his paranoid state had taken place. Nothing in the symptomatology gave any inkling as to the outcome except the especially trying circumstances under which it had arisen. case again gave evidence that anomalous psychotic episodes were to be expected when difficulties were thrust overwhelmingly on an individual barely able to handle ordinary problems in an environment to which he was reasonably well adapted and accustomed.

Another observation was recorded while treating psychoneurotics at United States General Hospital No. 30 during the summer and fall of 1918, where opportunity was offered to study patients who had developed psychoneuroses in this country as well as those who had developed them overseas. The cases could be separated roughly into two groups: (a) those arising in this country which were akin to similar states seen in civil practice, and (b) those which were the result of the unusual stress of active The majority of the former group showed insidious onsets and exhibited fundamental adaptative difficulties (inferiority feelings, masturbation worries, undue attachment parents, etc.) and their symptoms antedated the war. The second group, although including soldiers constitutionally inferior, appear to be men much better disciplined to living. Probably this contrasting condition was brought about by the psychiatric weeding-out process as practiced in the camps. The fact that the overseas cases arose largely in response to the one dominating desire — to get out of the war — explains, to our minds, the relative ease with which they were cured, *i.e.*, removal to hospital solved their difficulties. On the other hand, it was manifestly impossible to accomplish the same results for the domestic group of patients. We had, then, in the minor psychoses a lead to what we might expect in the major.

It was, therefore, with great interest that we welcomed the opportunity to study cases at a final clearing station — as it were — in a general hospital which was devoted to the major psychoses. We began our study of the material at United States General Hospital No. 34 in December, 1918. Many of the patients had been in the hospital for several months awaiting discharge. They had, apparently, completely recovered and each succeeding week brought a large number of additional recoveries. The majority of these cases had come to us with a diagnosis of dementia præcox, although some of the diagnoses had been modified at the more recent hospitals to "Psychosis, Undiagnosed." As critically as the incomplete case records would allow, it seemed profitable to review this group of cases to discover, if possible, by what signs a more adequate diagnosis could have been made, or what the disease picture showed which could have given the key to the correct prognosis in the cases of so-called "præcox." were prepared to take issue with the former classification which insisted on crowding all cases of the great group of the psychogenetically determined disorders into the one of the two great pigeonholes, - manic-depressive psychosis or dementia præcox. Our study of these cases has strengthened that revolt against any classification which fails to take into account the great group of psychoses that cannot be correctly labeled either manicdepressive insanity or dementia præcox. We have no quarrel with words, but we do feel that a large part of the inability of the psychiatrist to sum up the case in terms of observed facts has been due to the feeling that it must be fitted definitely into one group or the other. If we substitute affective and schizophrenic disorders and admit admixtures of the two states, we have a system sufficiently labile to include all cases, and we are not bound to prognostications which the facts do not warrant.

In reviewing the cases we have come to the conclusion that the errors of diagnosis were to be explained along the following line:
(A) The affective disorders were not recognized as such unless

they existed in "chemically pure" form. (B) Schizophrenia, as a benign psychosis, was not admitted. (C) Acute fear reactions with confusion, hallucinosis, and sometimes disorientation were fairly uniformly regarded as præcox. (D) Little attempt was made to understand the cases as reactions in terms of personality, conflicts and wishes; that is, the "surface" content was not given due weight.

A. Affective Disorders.

In the group of the affective disorders was found, by far, the largest number of errors. Records will be presented to illustrate the factors which it is felt should have given the clue to diagnosis. Each case offered has received at least one diagnosis of "dementia præcox." No claim is made that the material presented is either original or startling, but justification for publication of these observations seems to lie in the fact that the course and outcome of these psychoses are not in accord with the impression which these cases originally inspired.

Among the affective reactions three groups seem to have escaped recognition:—

- 1. Psychoses in which depressive ideas, *i.e.*, self-recrimination, ideas of guilt and inadequacy feelings, dominated the picture. Two cases illustrate this type of disorder:—
- Case 1. J. A. W., man, aged twenty-two, white, waiter, with nothing of interest in his personal or family history, when seen first at camp hospital, Nov. 23, 1918, was reported by a noncommissioned officer to have been restless and troublesome on the voyage to France. He had threatened suicide and refused to mingle with his fellows. His records state that he appeared depressed and moody, but there is no mention of the soldier's statement of affect. He said he had no confidence in his abilities and was unable to stand the strain of life. His mental processes appeared slow. On November 27 the patient was described as very quiet and talking only when spoken to. He appeared very nervous and spoke of worrying about his family and his own inability to make good in the army; he complained that he had no self-confidence. He answered questions slowly; there was no evidence of hallucinations or delusions at this time. January 12 the patient stated that he had always been seclusive and not like other people; he felt inadequate and said he did not want to live because he was not smart enough; he was afraid that he was no good. When admitted to this hospital on Feb. 21, 1918, he gave a clear account of his illness. He thought that he was sent to the hospital because he could not get along, and because everything worried him. He attributed his trouble to a nervous breakdown. The patient was slow in speech and

action, but gave no definite expression of depression. He has now completely recovered and shows no evidence of his old feelings of inadequacy, slowness of speech or action.

At no time should the psychosis have been regarded as ominous or schizophrenic. His slowness and lack of contact with people was apparently due to his inability to break through his depression while his talk and ideas were centered upon his own inadequacy. There is no evidence of projection or incongruity in the picture.

Case 2. — P. M., man, aged twenty-six, white, watchmaker, with one year's high school education, was excessively alcoholic and had a gonorrheal infection at nineteen over which he worried a great deal. He was drafted in June, 1918, and got along well while in camp. He was sent overseas in September, 1918. While there he drank rather heavily and on one or two occasions became boisterous, noisy, and impertinent to his company commander. He was admitted to the hospital Jan. 11, 1919, "in a more or less negativistic state, which persisted for eight days. He talked little or not at all, and, when he did, was much retarded. He had attacks of apparent unconsciousness, but there were no convulsive movements. He was oriented for time, but was not certain as to place." He stated that he had some disease in his system and that he was afraid that if he had anything to do with women he might give them the same sort of disease. He was well behaved on the ward, but he had numerous ideas about diseases, which to his mind accounted for his slowing down. He thought syphilis was responsible for all his troubles, and appeared somewhat depressed. In this hospital, on March 21, 1919, the patient was slow in movement and in speech. He rubbed his hands together and paced up and down the ward. He looked worried and anxious, and feared that he may have infected some one with syphilis. He dreamed that he was at home and was no good. He said he could not stop worrying. The patient was correctly oriented and no memory defect could be demonstrated. He was very neat, kept his clothes clean and pressed and his hair was well combed. He responded to questions very slowly and appeared thoughtful and preoccupied. In April he was interviewed again and said he felt that he was not wanted here in the hospital; that he had done wrong because he had not attended church when there were so many churches to go to. He said: "It's my own fault, it's all my own fault, I think that my trouble is caused by that disease which I have." When pressed for an expression of affect he replied, "I feel sad."

All the ideas expressed concerned the patient's own inadequacy and feelings of guilt. He accepted all feelings of guilt as the result of his own misconduct and did not attempt to make the world stand the brunt of his own feelings of incompetence. What was described as negativistic seems likely to have been a stuporlike state which is so frequently seen in profound depression.

2. Psychoses which showed all the mechanics of depression, that is, difficulty in thinking, slowness in stream of talk, inactivity, were mistaken for schizophrenic slumps and apathy.

CASE REPORT. — D. H., man, aged twenty-four, white. After finishing college in 1917 had a "nervous breakdown" in which he had marked feelings of incompetency; became "morose," depressed and contemplated suicide. He felt he was unable to be of any consequence in life; that he could not concentrate on any subject, and had a subjective sense of confusion. Although interested in chemistry and agriculture, he could not force himself to seek a position in keeping with his training and attainments. He therefore took a job in a mill, earning \$14 a week. practically recovered when he was drafted into the service. Shortly after his induction into the Army, his slowness returned. When seen in a hospital overseas on August 18, he was described as "showing marked lack of interest, with marked hesitation in answering questions; appeared dazed, with clouding of consciousness and disorientation for place and time." (We are inclined to doubt the statement as to disorientation because the soldier recalls accurately all hospitals in which he has been.) He is said to have had much "disturbance of association" and retardation, as well as to have been actively hallucinated, although no description of hallucinations was given. A week later, at another hospital, he stated that he was no good to the Army because he had not started right. slept poorly and worried because he was "mixing everything up," and expressed a desire to die. His replies to questions were extremely slow; there was no spontaneous speech, and his slowness was described as "dullness and apathy." On admission to this hospital, on Oct. 18, 1918, he is said to have appeared indifferent and apathetic. He was "pessimistic about his future, complained of lack of confidence, and could not see how he could be of any use in the world." In February his speech and actions were still slow. In the early part of March he was more cheerful, and worked as clerk in the canteen, but still gave expression to his inferiority feelings. When interviewed again in the latter part of March he had a subjective feeling of difficulty in thinking, looked worried, was slow in talk, and described his mood as "somber." He showed a morning-evening variation in his difficulty of thinking and slowness of speech. At that time he gave a history of his early youth. He has always been sensitive and has worried a great deal about masturbation. He had nocturnal enuresis until fourteen years of age, but this disappeared after an operation for varicocele. He felt, as a boy, that his masturbation had permanently injured him, and that it prevented him from developing a strong will or a fixed view in life. He realized, as he grew older, the part that sexual ruminations have played in his inability to reach out to a mature standard, but showed nothing suggesting projection or abnormal submersion of his auto-erotic difficulties. At the present time the patient has practically recovered. He is cheerful and is in sole charge of the canteen from time to time.

While the patient's type of personality suggests fertile soil for a schizophrenic development, there had apparently always been sufficient affect to swing him along. His slowness and difficulty of thinking appear to have been mistaken for apathy. His ideas at all times were consistent with his own feelings of inadequacy. The failure to see the case as an affective disorder was due to the fact that the affect was not on the surface and the mechanics were not given sufficient weight. Many case records show this same failing. Patients were repeatedly described as apathetic and disinterested because their reactions were slow; few records contain mention of affect and practically none give the patient's own words concerning his mood and feeling. In the next group is seen the tremendous importance of mood deviations as a leavening factor in the course of psychoses in which projection phenomena are prominent.

3. In affective disorders with schizophrenic features, too little attention was given to the emotional setting in which the psychotic development took place.

Case 1. — P. C., man, aged twenty-seven, a white laborer, who had reached the fifth grade in school, had a negative family and personal history as far as is known. He enlisted May 6, 1917, but for some reason was not sent overseas. In June, 1918, while in camp he developed measles, making an uneventful recovery. A short time after the infection he began to tire easily, his speech became slow and difficult, he could not sleep, was restless, and became apprehensive and suspicious for no apparent reason. He was reprimanded by a noncommissioned officer for slowness and was told that the former would hypnotize him in order to put life and action into him. In October he was granted a pass to go home. On his arrival he felt peculiar; his eyes seemed green, and he felt as if they were being drawn together. He attributed this to the fact that some one had hypnotized him and was exerting an influence over him. He thought that this person was some one in his company. Therefore he returned before his pass had expired to discover who it might be. He complained at this time of a heavy and sluggish feeling about his heart. Soon after his return he began to feel that he could hypnotize others; that the men in his company were talking about his actions; that they disliked him and were going to try to poison him. In addition, he felt that he was being talked about and that many remarks were being made behind his back.

He was admitted to this hospital Dec. 18, 1918, giving at that time a clear account of his illness. He appeared depressed and said that he felt "sad." It was with difficulty that he could be made to smile, and he spoke in a slow, hesitating manner. He complained of difficulty in thinking. He was well oriented and his appearance was neat and tidy. On February 15 he was discharged as completely recovered. His depression and slowness had entirely disappeared, and he realized that his ideas had been wholly imaginary. At no time previous to admission to this hospital had any notation been made concerning his mood.

We have, then, a reaction which would have appeared as extremely ominous, *i.e.*, with ideas of reference, influence and a sense of body alteration, had there been no frank affect; but the definite statement of sadness, with his slowness and difficulty in thinking, made the outlook relatively benign from the beginning.

Case 2. — P. A., man, aged twenty-three, white, with meager education and an insane mother, is said to have had "fear attacks with ideas of impending death" at the age of five or six. He also is said to have had "spells;" there is nothing in his later history, however, to suggest epilepsy. He has shown a roving disposition, being unable to settle down to any one job for any length of time. In fact, he has had so many different kinds of work, and each for so short a period, that he is unable to name his occupation. He was admitted to a hospital overseas on Aug. 21, 1918. There he was described as follows: "He appears dull and not very much interested in environment, talks slowly and ideation is slow." Said "some one is trying to take my thoughts away, and that the company commander was saying things about him. He also felt that he could tell what other people's thoughts were. Said he had been doped. rather sad and has loss of emotional tone." Two weeks later at another hospital he said: "They have tried to give me poison to do away with me because they thought I was a German." He admitted hearing voices, but there was no statement as to the content of his hallucinations. He was sorry that he had talked so much. On admission to this hospital, Oct. 7, 1918, he appeared depressed; said that he was "taken for a spy and a German;" he felt that his company thought that he was trying to do things detrimental to them; that the night watch could tell about him as he slept. At one time he imagined that poison had been put into his food; also that his thoughts were being read. He stated that he had been depressed, but felt better when interviewed. On discharge, in March, he spoke of his psychosis as having been "imagination and junk." His depression had entirely disappeared and he denied any ideas of influence, reference or persecution. His old roving disposition reasserting itself, he went away without leave on a number of occasions, but while in the hospital did excellent work in the shoe shop.

Although the affect was in the background, it gave sufficient evidence that his ideas of influence, reference and persecution, together with his apparent disinterestedness, were to be regarded as less ominous signs than one would ordinarily be inclined to believe.

CASE 3. — X. Z. Certain facts which might serve to identify the patient are omitted for obvious reasons. The patient is a young woman who was reared in an austere, religious atmosphere, in which dancing, card playing and theaters were strictly forbidden. She describes herself as sensitive and self-depreciatory; for example, she could not understand what her husband had seen in her to have married her. She admits that she always had a tendency to daydreaming and found it easier to build air castles than to obtain her satisfaction from reality. She was married a year and a half ago, and one month after marriage noticed a vaginal discharge which was diagnosed as gonorrheal, but no smear was made to confirm the diagnosis. A sense of modesty prevented her from taking her husband into her confidence. As it had been her greatest ambition to bear children, she worried tremendously for she feared she might be sterile. When her husband went overseas she threw herself into war activity with great fervor and enthusiasm. Toward the end of March she began to feel tired and attempted to bolster her strength by drinking large quantities of coffee. Her friends noticed that she seemed very happy, and she describes her mood as one of elation. No amount of work seemed too great for her. A short time previous to onset she had read a story in one of the current magazines about automatic writing. (During the period preceding her elation she had some notions that her physical fatigue might prevent her from being in fit condition to bear children on her husband's return. Her husband's mother had been opposed to her marriage.) She decided to make a trial with automatic handwriting and discovered that through this medium she could commune with God and her husband's father, to whom she had been greatly attached and whom she nursed during his last illness. She was told that if she was humble in spirit and pure in heart she would have many children and bring joy to her husband. She soon found that it was no longer necessary to use handwriting as a medium because she could communicate directly with God, Jesus Christ and the Holy Ghost. She was found, on March 31, lying naked on the floor; she appeared unconscious, although she stated after her recovery that she knew definitely what was going on the entire time. Her reason for this action was that she had been told that if she washed herself and appeared humble in the sight of God she would have many children. "When she was examined the next day she was 'loquacious and euphoric.' She said she had been dead for several hours, during which time she was in the presence of Jesus Christ; that she had purified her heart and been born again. She refused to divulge the nature of her interview with God, and insisted that the examiner was not pure enough to receive the information. She became angry at the examiner when he asked her if she had made any efforts to prevent conception, and stated that she could read his brain and knew that he meant to offend her. Her attitude at that time suggested exaltation. She laughed during the examination and gave the impression of elation."

On admission to this hospital she showed practically no signs of any psychosis. She gave a clear and cogent account of the episode, and after a few interviews, in which an attempt was made to point out the relation of the content of the psychosis to her longing and ungratified wishes, she accepted the point of view, was able to understand what each of her ideas had stood for, and abandoned all notions of the reality of her spiritual communications.

This fantastic flight into spiritualistic and occult phenomena with ideas of mind reading, exhibitionism and eroticism is the material out of which schizophrenic development is ideally woven. However, all of the content of the psychosis when viewed in the light of the elation and exaltation takes on a benign coloring.

B. Schizophrenic Disorders.

The next group, that is, benign schizophrenia, comprises a much smaller number of cases, but does include a sufficient number to warrant their presentation. We place in this grouping patients whose symptomatology is in no obvious manner different from those cases which form the classic group of dementia præcox. We see, in the schizophrenic development, a mechanism which Bleuler has designated as "autistic thinking," i.e., a withdrawal from reality, into a world of fantasy, with projection of that part of the personality, which is not tolerable, onto the The extent to which this withdrawal takes external world. place, with the necessary internal readjustments which appear objectively as bizarre activity and thought, determines the profundity and seriousness of the disorder. The factors which make for good are the patient's ability to be aroused to normal emotional responses, to be able to understand the psychosis in terms of conflicts and precipitating causes. The precipitating causes of the withdrawal are potent factors in estimating the hope of return to the real world of fact and recovery. In the war cases the prime motive for this flight from reality could, in the large majority of cases, be removed, and it is our impression that it was principally in those cases in which the conflict was closely associated with the instinct of self-preservation and the inferiority

complexes brought out by the war that startling recoveries were noted. Again, we do not claim that there is anything new about the recognition of this group. The war, however, did give us "stress and strain" in condensed and powerful form, and therefore performed for us, as it were, a large number of "experiments."

Case 1.— D. M., negro, aged thirty-eight, steward and cook, who drank alcohol in moderation, gave a negative family history with gonor-rhea at the age of thirty-three. After his graduation from high school he became a steward in a private club, and went into the catering business for himself seven years later. He failed after three years' trial and gave a history of a nervous breakdown at that time. He was "nervous and suffered from indigestion." We have no record of any more serious psychotic disturbance at the time of his failure. He spent a few months at Hot Springs; made an uneventful recovery and returned home, securing employment as a waiter.

At the age of thirty-two he married. The marriage was unhappy and his wife finally secured a divorce, after numerous attempts at reconciliation had been made. The patient maintains that his wife was unable to satisfy him sexually. In November, 1917, he enlisted, and was sent overseas in April. While still in this country he was "nervous, dissatisfied, and had stomach trouble." He had trouble with the men of his company because of his attitude of superiority and his higher education. In May he wrote his company commander complaining that the other men in his company were jealous of him and "had gotten on his nerves." He asked to be sent to the penitentiary as life was miserable for him, and stated that his only desire was to get to the front to earn a commission. (He was serving as a mail clerk in a labor battalion.)

When admitted to a hospital he thought that the adjutant disliked him and that a sergeant had mistreated him, making threats against him. He maintained that a Roentgen-ray picture was taken of his head to show that he was insane. He regarded his transfer from hospital to hospital as an attempt to get him out of the way. He thought he overheard officers and other patients talking about the commission which had been given him. Although he admitted that no one had ever told him directly that he had been given a commission, he insisted that many times he had heard people say, "That is the man with a commission." He thought that there was some plan to get up a political campaign against the governor of his State, and he was told to prepare speeches against it. then developed the idea that machines had been put around his head to obtain his speeches. When examined at this hospital he insisted that he had been given a commission in the Medical Corps and asked for permission to go to Washington to discover why the commission had not arrived. He felt that certain army officers and high officials were against him. On one occasion he heard the voice of a woman calling him from the second floor of the administration building; later he thought that a system of mind reading had been adopted to prevent his leaving the hospital. He spoke of having been given three commissions, medical, infantry and quartermaster; he said that every one could tell what he was thinking by mind reading, and that the other patients on the ward "tapped out" his thoughts. His explanation for receiving a commission in the Medical Corps lay in the fact that "medicine comes natural to me." On one occasion he offered to fight an officer, if he would remove his bars, because he had been asked what kind of a mason he was, and felt that there was some hidden significance to the question. On the street he heard people remark, "There is monkey face; they are making a monkey out of him." At all times he was correctly oriented, his memory was good, and he gave no expression of affect that showed any departure from the normal. He was always neat and orderly, and took excellent care of his clothing. Military manner and bearing were well maintained, and he worked willingly at whatever work he was asked to do. When allowed to leave the post on pass, he returned promptly and never got into any trouble. several occasions he was persuaded that his ideas were imaginary. Finally, after a furlough in which he renewed his contact with his old friends and interests, he abandoned these ideas completely and came to recognize them as a response to his old feelings of inadequacy and discontent, and as the fulfillment of a wish.

At first his delusions, passivity feelings, ideas of reference and tendency to misinterpretations made one uneasy as to the outcome of the psychosis, but the fact that he always worked readily, was interested in the activities of the post, was careful about his personal appearance, and that there was little tendency to rumination and daydreaming with inactivity, made us hopeful that there was sufficient material on which he could rebuild.

Case 2.— I. F., private, white, aged twenty-three, clerk, single, had nothing of interest in his family or past history. About the first of December he began to feel sick. In the morning when he arose he felt dull and dizzy; he complained of seeing things double and had pains all over his body; he slept poorly and could talk only with difficulty. He was given aspirin for several days, but did not improve. Finally he was sent to a hospital, but his physical examination showed no abnormalities, and at no time was there any sign of an acute infection. When seen in the hospital he showed marked indifference to his surroundings, lay for hours in one position, and held his body rigidly. He resisted any attempts to change his body position, but when finally moved maintained any position in which he was placed. He was well oriented, giving adequate response to all questions which were asked of him. He wet the bed, had to be

spoon-fed and drooled saliva constantly. After three weeks he improved, but gave a meager account of his illness. He said he thought that he had been paralyzed. At no time was there any evidence of delusional or hallucinatory experience. On admission to this hospital, March 7, he had recovered completely. He recalled the facts of his illness, but could give no explanation for his psychotic episode.

One would have suspected a priori that many such "acute catatonias" would be seen, but up to date very few have been observed in this hospital, and this case is the only one that has made a recovery. The absence of projection phenomena and the acute onset might have suggested the benign course of the episode. At first the case gave the impression of an obscure, infectious process, but the drooling of saliva and the incontinence in the absence of any confusion or delirium would seem to exclude this possibility.

Case 3. — L. K., private, aged thirty, machinist, moderately alcoholic, single, with a negative family and personal history, was born in Russia, and came to the United States in 1909. He worked regularly as a machinist, earning as much as \$3.25 a day. He was drafted Oct. 7, 1917, going overseas in June, 1918, although he saw no active service at the front. On Sept. 16, 1918, he was admitted to the hospital complaining of pain in the chest which he thought was the result of poison put into his coffee. He thought that the sergeant in his company was against him, also that the men in his company had been influenced against him. For this reason they undertook to poison him. He thought that gas and electricity had been put into his bed; he heard that his money was to be taken away from him. On awakening one morning, he told the ward attendants that there was blood around his umbilicus; that his blood had been spoiled; that syphilis had been given him, and that his semen had been drained away. He imagined that his picture was being taken wherever he went. After a few days his delusions appeared to quiet down, but one night he awoke and accused the nurse of trying to poison him, and said that electricity was put into his bed to make him jump. There was no frank fear except that exhibited by refusal to go to bed because of electricity or to eat because of poison.

When admitted to this hospital, Dec. 6, 1918, he was disinterested, and on questioning gave the same delusional system as obtained overseas. No expressions of affect could be elicited, and the soldier's expression or appearance gave no evidence of fear. Feb. 18, 1919, he had made a complete recovery. The mental status at this time showed no abnormality except that he claimed amnesia for the period while in France. He worked at various jobs about the post and said that he felt better than when he entered the service.

It is a striking fact that a large number of cases seen in this hospital have occurred in soldiers who are either foreign born or who cannot speak and understand English adequately. At present 60 of the 240 patients in this hospital are either foreign born or have serious language difficulties. A possible explanation for the large number of such psychoses may lie in the fact that foreigners are usually the object of jokes and bantering. Unless associated with others of the same race, they were apt to have little social contact and in many instances were ignorant of the causes of the war, and what they were fighting for. It is probably true that the general material from which immigrants are drawn is below par; at any rate, the observation is striking.

These three cases illustrate, in relatively pure form, what has been seen in fragments in a much larger group. The impure form contains delirious elements, initial periods of confusion and bewilderment, with various admixtures of delusional and hallucinatory projections. The content of these psychoses concerned itself with fundamental instinctive disability, and gave evidence of profound conflicts. It cannot be too strongly emphasized how important it is to recognize the benign nature of many of these disorders; all that there was of confusion and delirium should have been noted as favorable. Much of the hallucinatory experience was on the surface and concerned itself with visions of home and family, the voices of friends and relatives.

C. Acute Confusional, Hallucinatory Disorders with Fear.

These impure forms graduated into a group which seemed sufficiently well defined to be set off by themselves, i.e., the cases of acute confusional, hallucinatory episodes with marked fear. It is true that we have little understanding of this group which has been called toxic-infectious in the presence of definite, known etiology and "amentias" in its absence. While the content of many cases of this group was very much on the surface, a number showed reactions which suggested that the very roots of the personality had been stirred. Many cases showed considerable affect so that, had there been no records of initial disorientation and confusion, one would have classified the cases as affective. Stupors were quite common in this group.

Case 1.—S. C., corporal, aged twenty-nine, white, mill hand, was alcoholic until 1916, but has not used alcohol since. His mother is said to have been nervous. He had only a meager education. In 1914 the

patient had a "nervous breakdown" lasting three months, at which time he was "very nervous;" had sensations of "flashes" passing through his body and involving his spine; was restless and unable to work. He made a complete recovery from this attack. In June, 1916, he enlisted and was sent to the border. He became nervous occasionally, but did not have to go to a hospital on this account. He was sent overseas, and after a short time his organization moved to the front. In July, 1918, it is reported that he was knocked over by a shell, became unconscious, and was sent to a hospital. When seen at the casualty clearing station, he was confused, could give no account of himself, and had a "wild and anxious expression." His confusion disappeared after a few days, but he complained of weakness, and his talk was rambling and "irrational." He was transferred to a hospital in England, and there showed considerable emotional instability and some perplexity. He thought he was going to be killed, that electric batteries had been placed in the ward to kill him, and that his grave was being dug outside. He was recommended for discharge on a diagnosis of dementia præcox. When admitted to this hospital, Oct. 7, 1918, the soldier was entirely well. He recalled his feeling of intense fear, but claimed that he had no memory for the initial period of confusion or rambling talk.

Case 2. — R. G., private, aged twenty-four, oil chemist, indulged in alcohol to intemperance at times, but gave no history of excess overseas. Prior to enlistment he had done excellent work as a commercial chemist. There was no history of any previous mental trouble. After arriving overseas he was sent to the front, and there was a history of his having been sent to a hospital several times for hypochondriasis. On Nov. 20, 1918, after having been lost for about a week, he was discovered wandering aimlessly about, and when taken to the hospital gave a history of having had a headache and pain in the legs for a week previous. He had been unable to sleep. Three days later he became fearful, easily startled. thought he was to be injured, and that soldiers were pursuing him in order to shoot him. He said his food tasted queer. He was completely disoriented and was described as apathetic, slow, retarded and irritable. His "memory was poor, and he was untidy." On Dec. 7, 1918, the patient rushed out of the ward, saying, "They are after me." He secured an axe and struck a prisoner over the head, fracturing the skull, and accused the prisoner of having killed his father. He continued to refuse food, saying, "You have me now." While being evacuated to another hospital he tried to escape in order to avoid his persecutors. His disorientation continued, and he ran up and down the ward banging his head against the wall. He persisted in his delusions about his food and the attempt to kill him. He was untidy and incontinent, and gave the impression of His sleep was disturbed by terrifying battle dreams. admission to this hospital, Jan. 10, 1919, he appeared confused and depressed. He complained that he lacked ambition, was unable to concentrate, and thought that his memory was poor. At this time, however, he was correctly oriented, and showed no evidence of fear. His talk and response to questions was very slow, and he was not readily accessible. The depression and slowness, however, gradually disappeared, and he was discharged in March as completely recovered. His mental status at this time was normal. He showed correct orientation, no affect, and complete insight into his delusions and psychosis. He was alert, bright, showed no memory defect, and was ready to take up his job as a chemist.

A question, which for army purposes is of great importance, arose in this case, and gave us warning that one should accept facts of the history, taken during the psychosis, with caution. He gave a definite history that two years previous he had had a similar mental upset. His family, who were most anxious to co-operate, denied this, and were unable to give any facts that might have been construed as a psychosis. On his recovery the soldier also denied any previous breakdown. Obviously "line of duty" questions are seriously involved, and one should in justice to the soldier accept only such history as seems beyond peradventure.

CASE 3. — M. P., private, white, garage worker, whose father was moderately alcoholic, also drank in moderation. He was a "delicate child" and had "fits" from the age of five to twelve. He reached the sixth grade in school. He was sent to France in December, 1917, only to develop "stomach trouble" as soon as he arrived overseas. He was on sick call constantly, and in July, 1918, developed tremors, growing more and more "nervous." In August he became confused, disoriented, losing himself on several occasions. His statements while in the hospital were quite inconsistent; he spoke vaguely of having been deafened by the noise of motors and appeared frightened and anxious. He was lachrymose, inattentive, seclusive and unresponsive to questions. His condition was much improved after three weeks and he asked to be sent back to his This request was made at an evacuation hospital where it was generally understood that soldiers were not returned to the line. When seen at this hospital, Oct. 7, 1918, he had completely recovered. He gave a clear account of his illness and verified by definite statements the fact that he was fearful.

Case 4. — G. A., private, aged thirty-one, mill hand, white, born in Italy, was moderately alcoholic, and, until his present illness, was never in a hospital. He was drafted in April, 1918, and was sent overseas the next month. Throughout his army career he worked in the kitchen, and did not participate in any engagements. He gave a history of having been gassed in October, 1918, but the medical officer who observed him

first made no note to this effect. When first seen he was confused, wandered aimlessly about, was unkempt and dirty. He appeared anxious and frightened. A few days later he gave a history of having had bad news from home and of having worried a great deal on this account. The voices of his mother and sister kept calling to him to come home. On occasions he became frightened and attempted to escape from what he thought was a jail. His talk was rambling and fragmentary. He wept frequently and developed an irregular tic of head and facial muscles. Later he gave a history of constant fear that something terrible was going to happen to him. On several occasions he was disoriented, but the disorientation does not seem to have been constant. When admitted to this hospital, Jan. 21, 1919, he was correctly oriented, alert, gave a clear account of his illness, showed no affect, and there was no evidence of confusion. He was discharged ten days later as completely recovered.

It is interesting to note that "gassing" has become as respectable a cause of mental disease as "shell-shock." Almost every recovered case until the signing of the armistice gave gassing as one of the causes of the illness.

To summarize the foregoing groups it may be said: -

- 1. The affective disorders were unrecognized in the cases in which (a) ideas of guilt, self-recrimination and inadequacy statements dominated the picture, rather than frankly expressed depression; (b) the mechanics of depressions, i.e., difficulty in thinking, slowness in the stream of talk and inactivity were the prominent features; (c) schizophrenic elements were present. Too little weight was given to the emotional setting of this group.
- 2. Benign schizophrenia was not correctly prognosticated because: (a) the acute onset was not taken into account; (b) the patient's capacity for activity and interest was ignored; (c) there was no realization of the fact that the existing cause of conflict could be more readily removed than is usually the case; (d) the patient's ability to understand the psychosis and its causes, and his ability to make necessary readjustments, was underestimated.
- 3. In the acute confusional hallucinatory psychoses with fear, too little weight was given to the elements of confusion, delirium and affect.

The foregoing cases were selected from a large number, all of which were diagnosed as dementia præcox.

D. ACUTE PARANOID DEVELOPMENTS.

Two other groups of cases seem sufficiently interesting to deserve comment. First, a surprisingly large number of acute paranoid developments have been seen. Some have appeared with affective background, and others without. The occurrence of paranoid trends has been very frequent throughout all the war psychoses as observed here. One is led to accept the statement of Bleuler that paranoia is not the unusual disorder that institutional material would lead us to believe. Some of our cases which were originally on an affective basis have settled down to a delusional system without any affect, and this group lends some weight to the theory that paranoia is primarily a mood disorder. Other cases lend no support to this view and seem to have shown a pure "intellectual" disturbance from the beginning. The following two cases are chosen from a group of ten or twelve: —

Case 1.— C. T., coal and ice dealer, aged twenty-seven, had reached the seventh grade. He was moderately alcoholic, but not to excess at any time, and had been nervous a year and a half before entering the Army. About three years ago he had a breakdown which lasted for three months. He was afraid to leave his house at this time, was very "nervous," apprehensive and feared that he was going to die. He had cardiac palpitation, general body tremor, and showed great restlessness.

He was drafted in September, 1917, and was sent overseas in April, 1918. In August he became suspicious, thinking that he was being watched. He felt that the relatives of a married woman whom he had known illicitly in the States were in his company and were planning to do him harm. He began to watch the men about the kitchen. His own statement at that time was as follows: "They acted suspicious, and seemed to be laying for me. They were always watching me, watching my movements. I had the cooks with me, and they (the conspirators) were apparently waiting for them (the cooks) to go away. They stayed all day, just watching and waiting for me. Then they returned to the company. That night I told my captain and he advised me to get a rest. The next day I was sent to the hospital, and the same thing started there. At night two men sleeping on each side of me flashed lights in my face and turned their wrist watches at me to show where I was lying. This kept up for four or five days. I could see them talking in conversation. They always appeared suspicious to me because they were all in one bunch. They sent me away to another hospital because I was afraid that they were plotting against me. There another gang started. They laid to get me. There is one fellow here who came with me, and I am suspicious of him. He started the trouble and there is somebody on my trail all of the

time. It is because I had trouble back home over a married woman. Her husband started it back in the States. I was all right until two weeks ago. Then they found me here and started the gang after me. I am not getting a square deal, they follow me wherever I go and they are going to kill me. They bother me day and night so that I can't sleep because of them. They are always whispering about me. There is a conspiracy on to get me. The Italians are in it." The patient was said to have been apprehensive and suspicious, and to have shown considerable fear. He looked about anxiously. His records, however, give no statements of the patient, himself, concerning fear. He could not be persuaded to abandon his delusional system and insisted on being evacuated to the States to avoid his pursuers.

On admission to this hospital, Oct. 7, 1918, the soldier showed no signs of fear, suspicion or apprehension. His behavior seemed entirely normal, and he said that, while he did not fear his persecutors while in the Army, he had an idea that they would try to persecute him in civil life. He could not be convinced that his suspicions and fears were imaginary. His attitude at this time was one of placidity. He talked freely about his delusions, but showed no fear of any sort. He fell into the hands of one of the other patients, and after a few days he asked to be allowed to appear before the disability board again. He seemed to be entirely converted by his friends, and stated that his ideas were imaginary, having no foundation in fact. While awaiting discharge he was questioned repeatedly and each time stuck to his position that the whole affair was psychotic. Persistent attempts to lead him to accept his delusional system again were unavailing.

It is impossible to be sure whether the statements about fear refer to a dominating mood or whether fear was the result of the ideas of persecution. His delusional system at this hospital, however, stood free from any mood disorder.

Case 2. — M. C., aged twenty-eight, butcher, Italian, nonalcoholic, was born in Italy, and came to America in 1908, after four years' schooling in Italy. He was drafted in October, 1917, and went overseas in August, 1918. While working as a laborer he had some trouble with the men with whom he was associated. He thought that some of the men in his company were going to knife him or use a razor on him; he could not sleep because of the fear of being killed. He appeared very fearful and apprehensive and declared that he was no good; that the other soldiers were talking about him, and that he was going to be killed as a result of this. On October 21 he was described as talkative and excitable. He told the same tale of persecutions, and admitted hearing voices telling him he was to be killed because he was no good to the Army. There was no evidence of depression. When admitted to this hospital, Oct. 25, 1918, he showed no abnormality in his behavior or mental status. He denied any ideas of

persecution, influence or reference. No expression of affect could be elicited. He showed little insight, however, but was willing to admit that his ideas were imaginary.

The second group is heterogeneous in the sense that it includes all types of reactions, - schizophrenic, affective and confusional, — but possesses this one common feature, — the initial period shows symptoms of the so-called psychoneuroses. In our work we have followed Dana's and Meyer's notion of speaking of major and minor psychoses. The cases in which hysterical, psychasthenic, neurasthenic and anxiety symptoms occur in pure form shade insensibly into the full-blown psychotic developments. The army workers have attempted to separate the two groups — psychoses and psychoneuroses — probably because of the desire to prevent "the stigma of insanity" from being attached to patients whose adaptive breaks did not lead to total incapacity. When dealing with the facts of cases as we can understand them, that is, of reactions of psychobiologically integrated organisms, we believe that no essential difference in mechanism, or even in the severity of reactions, can be made out on any large scale. Hysterical delirium may appear as præcox; anxiety neuroses may assume the ranks of agitated tension states with complete major psychotic pictures; psychasthenic symptoms may be mixed with profound depression, and neurasthenoid symptoms may progress to deteriorating schizophrenias. Such a phrase as "the insane psychoneurotic" shows the futility of attempting a classification of patients into these two groups which aim only at reaction tendencies. At the Medfield hospital, supposedly devoted to the insane, we have seen every conceivable variety of mixture of symptoms. At United States Army General Hospital No. 30, which was supposedly devoted to the psychoneuroses, a somewhat similar situation prevails. This, according to our notion, was not due to the carelessness of previous examiners, but followed as a corollary of this false division. We present two cases as illustrations. The first one seemed clearly hysterical at the onset, but apparently assumed a more automatic character, and readjustment took place at a deeper The second case was also hysterical and superficial at onset, but matured into a major psychosis with features that were distinctly ominous.

Case 1.—R. G. B., aged thirty, painter, moderately alcoholic, who had reached the eighth grade, entered the service April 3, 1918, and was sent overseas in June. Early in August he was sent to the hospital, be-

cause of complaint of sharp pains in the cardiac region, palpitation and rheumatic pains in the left leg. He had occasional fainting spells with sensations of blackness before the eyes. A few weeks later he showed no improvement in his somatic complaints, and, in addition, began to show a lack of interest in his surroundings. He sat by himself and could not be aroused to any activity. He insisted that his heart had stopped beating and that his lungs had collapsed so that he could no longer breathe. thought that his food did him no good. No expression of affect was elicited. When evacuated to this country he was described as "seclusive and showing a marked interest defect." When first seen at this hospital in October his apathy and disinterestedness continued, and the original diagnosis of dementia præcox was confirmed. At the end of November he was re-examined, and examination at this time showed him to be normal. He was alert, cheerful, interested and without complaint. He said he felt as well as ever. He stated that he was nervous before entering the Army, and admitted that when he was taken sick he had just heard that his company was going to the front.

Case 2. — E. A. B., aged twenty-two, white, moderately alcoholic, had a brother who had been discharged from the Army on account of major hysteria. He had had periods of undue worry and has always been regarded as having a nervous temperament. These periods of slight worry and depression have usually been followed by slight exhilaration, but have not been sharply enough differentiated to suggest a cyclothymic process. He graduated as a dentist, but was unable to pass the State board examination. He was forced to marry his wife because she was illicitly pregnant. The girl, however, was acceptable to him and to his family. While in the service he worked as a dentist, although he was not commissioned. Early in November he received letters from his wife saying that she was not getting on well with his family with whom she was living. She also wrote that she was pregnant, and thought she would die. This caused him some worry, and he felt that he ought to be back in the States. He arrived overseas in September, 1918. In the latter part of November, 1918, he had three attacks characterized by fainting with convulsive movement, but without loss of consciousness, sphincter control, or injury. He himself characterizes these attacks now as "hysterical." He feels "sure of this because they resemble attacks my brother had." He was classified as an epileptic and recommended for transfer to the United States. These attacks appear to have been very near malingering, or at least to be definitely in relation to a desire to return home. He knew that his brother had been discharged from the Army on account of hysteria. While in the hospital his worry and depression increased. He began to think that people looked at his feet, and by this they meant that he was a sex pervert. He also thinks they called him a sex pervert. While en route from Tours to Savonay the idea developed that he had heart disease and paresis. He felt that he never would get well.

On examination here, March 21, 1919, it was found that he was alert and answered questions promptly and relevantly. He avoided discussion of his seizures, but when confronted with the notion that they caused his evacuation to the States and served a purpose, he did not deny it, but smiled acquiescence. He wept when his "sexual perversion" was discussed. He gained control readily and laughed at his instability. His family insisted that he had always been as unstable as the foregoing indicates.

Although the emotional instability and lack of adaptability indicate that we were dealing with a constitutional inferior, the transition from the surface psychoneurotic episode to an affective psychosis with ideas of reference is evident and suggested an ominous coloring.

Conclusions.

Our study of some of the "war psychoses" revealed that —

- 1. Affective disorders were frequently mistaken for dementia præcox.
- 2. Psychoses showing typical schizophrenic development had recognizable benign features.
- 3. Acute confusional hallucinatory psychoses with fear were incorrectly diagnosed as dementia præcox.
 - 4. Acute paranoia was a relatively common psychosis.
- 5. The distinction between psychosis and psychoneurosis is untenable.

NEUROPSYCHIATRY IN ARMY CAMPS.*

By George E. McPherson, M.D., Medfield, Mass., Major, M. C., U. S. A.

At the beginning of the war there were said to be only two or three regular army officers who had given any special attention to neuropsychiatry. The broad application of this specialty in the examination and care of soldiers was a comparatively new idea, its introduction being looked upon as an experiment. To have persuaded the powers-that-be that neuropsychiatry should have an important place in the medical system of the Army, was in itself no slight achievement. To have placed over 700 especially trained men in the service and under the care of our section is deserving of great commendation, and, apparently, has proved of great value.

Whatever may have been its shortcomings, psychiatry, in the examination of soldiers, "made good" to so pronounced a degree as to warrant this branch of medicine a permanent position in the army medical equipment. At first inclined to scoff, the line officer soon became convinced that in the solution of many of his soldier problems his best friend and adviser was the psychiatrist. By the time the writer entered service a year ago, the high officials of the camps had apparently been won over to sensible procedures in the examination of those cases properly handled by our department.

Early drafts and volunteer enlistments which could not obtain satisfactory examinations supplied a large proportion of mental breakdowns and "misfits" constantly requiring attention until finally discharged. The number, for instance, of the mentally deficient which early went overseas loomed so large as the weeding-out process went on that the commanding officer of the A. E. F. cabled an order calling for more care in the selection of men and particularly for the rejection of such cases. At the commencement of activities, pressed along by the fear of shortage in man power, many thousands of men were assigned to service which they were unable to perform, so that development battalions became cluttered with much material which later had to be discharged as unfit.

^{*} Read at the annual meeting of the American Medico-Psychological Association at Philadelphia, June 8, 1919, and originally published in the "American Journal of Insanity."

The belief that any man who had been able to perform a certain class of work in civil life could therefore render equivalent service in the Army was shown to be based upon a misconception. Many men had done fairly well in the community only because they had not been called upon to adjust themselves to an unusually rigid environment with the forced restrictions such as obtain in the service. Under these latter conditions such men became mentally demoralized, upset the organization morale, and caused worry and expense, beside often being under guard and before courts-martial when, in reason, they should have been quickly and permanently eliminated from the Army.

To those who had the fortunate experience of serving in the camps, there will be little that is new in this paper. It is written, however, with the expectation that those whose other duties kept them out of the service will be interested in a sketch of the practical work of psychiatrists in some of the cantonments. the various cantonments, psychiatrists were to be found on duty in the camp proper and also at the base hospitals. Placed under one head, it was made possible to co-ordinate the performances of these two sets of workers and thereby to eliminate, via camp, a large number of cases who would, ordinarily and unnecessarily, have been sent to the hospitals for disposition. The grand old game of "passing the buck" was in full sway in the camps, so that, at one time, the hospitals were receiving nervous and mental cases who should not have been admitted, as they could have been disposed of in short order by the machinery for discharge already existing in the camp.

As a bit of administrative detail, we had it so arranged that, with the exception of a violent case or in a similar emergency, no soldier was sent to hospital unless previously he had been examined by a camp psychiatrist and recommended for such admission.

The importance of our work may be emphasized by submitting a few figures. During the months of May to September, 1918, inclusive, 54,000 recruits were examined at Camp Upton, New York. Of this number, 1,050, or 2 per cent, were rejected for nervous and mental disorders. At Camp Gordon, in four months, July to October, inclusive, 58,850 men gave a rejection of 1,225, or 2.8 per cent, for similar diseases and conditions.

THE CONSCIENTIOUS OBJECTOR.

The conscientious objectors had loomed large as the worst problem in camp when the writer first assumed charge of the neuropsychiatric work of the cantonment at Upton. Approximately 900 such men had been collected under special guard and segregated while awaiting the final disposition of their cases. A bad half hour was spent in an interview with the commanding general, who demanded the proper solution, from our standpoint, of this problem, which was rapidly assuming alarming proportions.

Unlike the Quakers or the Mennonites, both of whom agreed to domestic service, the objectors at Camp Upton, who were largely of European birth, refused not only to do full military duty, but in many cases would not put on a uniform, do a stroke of work, or even sign the pay roll. Such men had exasperated the authorities, and in time a number of the worst cases (that is, those with whom nothing could be done by persuasion) were sent to the Psychiatric Board for examination and report.

We were then confronted with the question as to the proper course to pursue. It had frequently happened that these flagrant cases had been excused from responsibility by a previous board on the basis of constitutional psychopathy, which, in turn, accounted for the unflattering opinion of psychiatrists held by the commanding general. There can be no doubt but that cases were deviates from normal, even psychopathic. These were men whose earning capacity and social status had never been even average. Many admitted belief in work simply because they were forced to earn an existence for themselves. Many appeared to be scholarly, or, rather, to be great readers, especially of socialistic literature. Numbers of them appeared, moreover, to be strict vegetarians and expressed their repugnance of shedding of blood, even that of animals for food. No doubt they were "queer."

However, we had to report on their mental capacity and responsibility at a time when our country was facing the tremendous emergency of war. Such men, if released, would have become the rankest sort of propagandists. No civil institutions would have held them if they could have been committed, which seems unlikely. These objectors certainly knew it was wrong to commit murder, arson, or other crimes against law. Surely they knew it was wrong to break the laws of the country, and knowing such they could be held accountable for their misconduct.

Our final solution of this problem was this: The objector was classed as a constitutional psychopath only if facts warranted such a diagnosis, but he was held in the opinion of the Board "to have sufficient mental capacity to justify his being brought to trial" for refusal to obey military law. His conviction meant from ten to thirty years at Leavenworth, which provided the only institution which could keep him from becoming a public menace. Such summary action by the courts did much to effectively change the attitude of the conscientious objectors as a class, especially after thirty of them were sent to Fort Leavenworth. Personally, from observation of their attitude toward confinement at the base hospital, I believe these men found in hospital or prison care better existences than many of them had ever known before.

THE DRUG ADDICT.

At Camp Upton drug addicts constituted 17 per cent of the rejections for mental disease, while at Camp Gordon they made up 3.27 per cent of such rejections. Many of these unfortunates pleaded to be accepted as they professed a desire to be cured of their habit and they thought the army life could bring this about. However, this scheme did not work, and it soon became evident that cures were, as a rule, out of the question; and, again, that all such men lowered the morale of organizations. Much evidence was obtained to prove the existence of an extensive business in the sale of drugs, not only to old habitués, but with the intent to increase the number of drug users.

After a fair trial of the idea that drug addicts could be made serviceable (which failed, by the way), all such addicts were rejected in all proved cases, as they were shown to be poor material for army purposes. There may have been a few cases of recently acquired habit who recovered completely, but they were the exceptions. No recruit was discharged on his own say-so, but in positive cases corroborative evidence was not hard to obtain. Apparently the number of fake addicts was not large, very few trying to evade service by this device, although quite a number had not been at the habit long and were readily weaned from the drug. These last were not established cases and had none of the appearances of the old-timer.

A survey of 100 drug addicts gave them a mental age rating of twelve years, which is not materially different from that of other soldiers of the same educational-industrial level. As a rule, they were, however, unskilled or poorly trained workers whose schooling, in 50 per cent of the men, did not extend above the fifth grade. Only 10 per cent were foreign born and the hundred was equally divided between two army drafts, one white, the other black. In both classes, the drug addict from a rural community seems to be a rare specimen.

Out of 100 cases surveyed, 56 had been committed to penal institutions on charges other than drug addiction. Seventy-two men reported one hundred and seventy-three unsuccessful attempts at a cure. Although not measurably deficient, these men were certainly inferior in fields other than intellectual.

THE EPILEPTICS.

One would have supposed that such cases as epileptics would have been well weeded out by various draft boards with less difficulty than obtained in many other classes of registrants. However this may appear, large numbers of epileptics entered camps, later to be discharged when their disabilities came to our attention. Many men came to camp in the drafts with definite histories of seizures, showing scars on bodies and tongues, while some showed quite marked deterioration. Such were rejected, even on suspicion, some may say, but such a course seemed the common sense one. There was, of course, no defence against the epileptic who willfully deceived and who showed no evidence of his infirmity. One simply had to wait for his attacks, and, fortunately, they generally appeared quickly under the ardors of drill. Probably about 3.5 per cent of 1,050 rejections were because of this disease.

While possibly foreign to this paper, it is interesting to note that at Plattsburg men sent home from overseas as epileptics fell into one of three groups: the true epileptic; the hysteric; and the soldier who had "spells," "fainting spells," which appear to have been caused possibly by some endocrine disturbance.

MENTAL DEFICIENCY.

Thirty per cent of our rejections for nervous and mental disabilities was for mental deficiency, about 6 per cent of all cases examined. Such men offered a serious problem, as we had to overcome the disinclination of others to allow rejection of a man who looked healthy and strong. Orders from Washington instructed examiners to consider no man unfit for military service who should grade up to or over ten years, mental rating. One

must also grade eight years or lower before he was to be considered unfit thereby for domestic duty.

It is my belief that no other class of men made for so much mischief in the Army as did the feeble-minded, and, as has been said before, the stories of such soldiers as came to our especial attention proved the statement that ability to get along in civil life did not, of itself, insure satisfactory army service. Such an idea was not workable, and a large number of cases we had to examine were of just such soldiers who could not get along in a strange and exacting environment.

Psychological group examinations rendered an important service in calling to our attention men who graded low, and that earlier than without such ratings. All such were referred to the psychiatrist from the psychological boards, and in many cases were accompanied by a recommendation for rejection. More careful consideration of these men would find some fit for domestic duty, but, on the whole, the low raters did not prove "worth their salt."

The defects in fields other than intellectual were generally brought to notice when the higher grades of morons, for instance, failed to fit properly into their several assignments or organizations. Much that was reckoned as criminality or insubordination can be charged to the mental deficiency of these soldiers.

THE PSYCHOTIC CASES.

In the case of the psychoses, we were limited in the camps of my acquaintance to relatively few varieties. Manic-depressive psychoses were present in very small numbers, especially while the drafts were coming in. From our experience at United States General Hospital No. 34, it is to be inferred that such manic-depressive cases developed in considerable numbers after November 11. Most of the insane in the camps fell into the schizophrenic group and were generally called dementia præcox. In practically all of such soldiers it was possible to obtain outside histories which, together with the patients' stories, appeared to indicate that the acute psychotic episodes were but other stages in conditions which had existed for some time, even if below the surface. After worry at home over the draft-to-come, many men seemed to just go to pieces once they reached camp.

The alcoholic psychoses, as one would expect, in a draft of men between twenty-one and thirty-one, were not numerous. There were a few cases of chronic alcoholism, but astonishingly few. Acute alcoholic hallucinosis was found in but few men also. Outside of numerous men who had endeavored to accommodate themselves to too many farewell parties and who came to camp intoxicated and shaky, alcohol did not cause much concern in the examination of recruits.

Neurosyphilis contributed many cases for rejection, taken in the aggregate. In one draft of 800, luetic cases amounted to 7 per cent of men examined. As might be expected, cities seemed to furnish a much larger per cent of luetic disabilities than did the country. Men so infected appear to have broken down very suddenly overseas, so that at No. 34 we have seen numerous cases who presented an extremely rapid onset and course, returning to this country with well-marked paresis.

Experience in camps terminated a bit too early to speak of the toxic-infectious psychoses, of which we saw little. It appears from observation of cases at Plattsburg and at Norfolk, that following measles, influenza, and other acute diseases there developed frequent acute psychoses, most of which seem to have been only temporary.

CONSTITUTIONAL PSYCHOPATHIC STATES.

Under this heading one may speak of a large group of men, many of whom were accepted for service only to become very unhappy and a source of great concern to every one interested. At Camp Upton 50 were discharged during five months, while at Camp Gordon 299 were thrown out in four months. Emotional instability, inadequate personality, and sexual psychopathy provided the subdivisions under which the majority of psychopathics were classified. These three classes just mentioned were found to consist of poor material to begin with, and the demands of war did not help them in their adjustments. It is my belief that we should have been even less conservative in the rejection or discharge of persons so unequal to the demands of the Army as were this class.

THE PSYCHONEUROSES.

One can hardly describe the amazing story of this class of recruits and other men who had entered the service only to fall by the wayside when active duty was undertaken. It is difficult to believe the frequency with which men were turned down for inability to drill or to march. Enuresis, hysteria, neurasthenia and stammering furnished a large quota of rejects and dis-

charges. It was interesting to learn the frequency with which other forms of the psychoneuroses had previously been afflicted with enuresis. Needless to say such men were constantly referred to us for disposition.

PRISONERS.

My first experience with a court-martial convinced me that many prisoners, should they be examined, would in all probability, be found to be mentally irresponsible, as was the case herewith described. X. Y. Z., a southern negro, was referred to the Psychiatric Board with his history: He was under arrest and awaiting trial for the murder of a white man and woman, the crime being committed while the soldier was on guard duty. His passions having been aroused by his discovery of a little "party" in the woods on his post, he shot the man; and when, resisting his advances, the woman tried to get away, he killed her, also.

The crime was soon discovered and after an investigation this negro was placed under arrest and for some reason was taken to New York City for arraignment. At this hearing he confessed the deed and signed a written statement of confession. Returned to the camp, he was put in confinement and our Board was asked to examine him. The first step in our procedure was to have a mental rating, and one of our own men did the necessary testing, giving the negro a mental age of 8.0 years. In order to be officially precise one of the Psychological Board was also asked to examine him, which was done within two days. At this time a rating of 7.8 years was returned, the prisoner being unable to profit by the previous test.

Upon talking with the prisoner, we found him to be illiterate, dull, and entirely devoid of any appreciation of his plight. He denied the truth of his confession, although it was in detail and could not have been made up by one unacquainted with the intimate facts of the case. This confession was made, he persisted, so that "he might be allowed to leave jail and rejoin his company." His description of the crime, however, was too accurate to have been given by any other than a principal or near witness. After considering all the facts of the case, we unanimously reported this soldier as "not possessed of sufficient mental capacity to justify his being brought to trial."

The court was convened: all members of our Board were called upon to testify and the majesty of military law was im-

pressed upon us. The average line officer appears to think that a crime having been committed, some one must necessarily be punished, really an "eye for an eye" sort of prejudice. As long as this negro could tell the court he knew it was wrong to commit murder, in their opinion he must be a responsible party. In spite of our testimony, he was found guilty of murder, and sentenced to be hanged. The finding of the court and this sentence was approved by the commanding general of the camp. The reviewing authority at Washington, however, set aside the verdict and ordered the man sent to an insane hospital for life, as a dangerous person and irresponsible. The attitude of this court toward the Board was much more sympathetic after this conclusion of the affair became known.

Another instance occurred at Camp McClellan, when three men were arrested for impersonating officers and for other irregularities. It seems two prisoners in the guardhouse were released by a mess sergeant, the three then proceeding to be real "wild men." Stealing officers' uniforms and money, they took a jitney away from its driver and started on a career of crime across two States, only to be arrested and brought back.

The leader and brains of the trio was a pronounced constitutional criminal with a bad record of robbery, forgery, and implication in a murder. The others were both mentally deficient, grading less than nine years, and their histories were full of asocial acts. One feeble-minded soldier had been in the service over five years and admitted that in all that time he had not, in the aggregate, been out of the guardhouse more than six months. Yet he had been a source of expense and worry all that time, when he should have been discharged long before.

My early observation of prisoners so impressed me that by arrangement with the camp psychologist every prisoner was given a psychological test as soon as possible after arrest. With the judge advocate we had an agreement by which each prisoner found to be defective mentally was reported as such, freed from charges, and discharged from service without further delay. In this way we were able to select and discharge such cases early, with all its entailed saving, whereas before we had not passed upon many cases unless deficiency had been suspected by the officers handling them.

Finally, the service at the base hospitals deserves some comment. Here psychotic cases, prisoners, and suspected malingerers, drug addicts, as well as organic diseases, were

studied and disposed of according to necessity. Many soldiers were seen in consultation with members of other services, and a surprisingly large number of psychiatric cases were culled from medical wards. This was particularly true of the mentally deficient.

As time went by the wards of the hospitals became filled with soldiers who could not be considered "not in line of duty" cases and who had to be cared for. Now the Bureau of War Risk Insurance is relieving the Army of such responsibilities in cases which have been in hospital in this country for four months.

It is to be expected that the necessity for neuropsychiatry has been sufficiently established during these last two years to insure the more careful selection of men for the service at all times. Certain it is that our recent experiences have opened new lines of psychiatric investigation and endeavor as well as emphasized the great need of more careful and thorough handling of similar problems in civil life.

AMNESIAS IN WAR CASES.*

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The following cases presented as examples of war amnesia have been selected for very definite reasons. First, their family and personal histories are negative so far as could be elicited; second, their educational histories gave evidence of their being of average intellectual capacity; third, they had all been in active service from six months to a year and one-half before the onset of their amnesia, and had engaged in front-line fighting.

There was no question of these soldiers being psychotic or neurotic prior to their loss of memory. All were the type of individual that one would have considered desirable for military service. Further, these cases, although having incidental organic elements in their etiology, are primarily of psychic origin; that is, the emotional factor is by far the most important. The fact that in two of these cases the memory was completely restored by the use of psychotherapy again emphasizes the importance of psychic trauma in the causation of the amnesia.† The attempt will be made here to show the relation of the war amnesia to the process of dissociation. Rivers has discussed dissociation in its instinctive aspects and also stated that it has also been utilized by the later accretions of human mental process — thought and reason. It is, thus, a general fact not only of instinct, but of all of mind.

Dissociation plays a most important part in the mental economy. The psychologist usually thinks of dissociation as some abnormal process manifesting itself only in unusual situations and not as an aspect of the normal mental life. Mind without dissociation would indeed be poorly organized. There must

^{*} Read at the seventy-fifth annual meeting of the American Medico-Psychological Association, Philadelphia, Pa., June 18-20, 1919.

[†] Also there are many other cases in which psychotherapy (auto or hetero) evolved a cure,—the receipt of a letter from home, meeting a man from the same company or from the same home town, etc.

be some fact in mind which erases from consciousness previous experiences and makes possible clarity in the present content. Passing from one phase to another — from fear to joy, or happiness to grief — depends for its smooth working upon the adequacy of the dissociative process. Often there are blends of mental states, as when a child smiles through its tears, but these fortunately are momentary and very soon the new mental content is appreciated without blur. In the realm of thought-habit there is much more smoothness in mental working than where instincts and emotions predominate. One can go from idea to idea more readily and more gracefully than from one emotion to another. Whatever the process may be whereby one mental fact is dismissed from the mind and another enters to take its place the general notion of dissociation covers it. The fact of dissociation, then, runs a long gamut in mental life from just the dismissal of things from the mind to the abnormal condition of multiple personality. It is, however, rather hazardous to attempt to include under this concept of dissociation the dual or multiple personalities which Dr. Prince¹ has so interestingly described, especially, of course, as no organic pathological factors are accounted for under the psychological conception of dissociation which Rivers advances.

Dissociation — as the process which clarifies the mental content and integrates what is called the attention — serves many hygienic purposes in the mental life. For, in the cases of war neuroses one of the great etiologic factors is the duality of consciousness, — the presence of fear and pride opposed to each other and gradually wearing down the individual's resistance. One can well say that what ordinarily most makes for mental health and strength is the unification of the personality's effort about some basic purpose, and the absence of painful or pleasurable distractions from this work.

The inability of the dissociative process to function normally, as in the usual coming and going of things of the mind, lead in the war cases (due usually to long-continued opposed pride and fear) to a severe impulse from the dissociative, which, under the conditions of lessened resistance in the personality, was able successfully to erase from the individual's mind large gaps of experience. This served the hygienic purpose of disposing of stimuli which were intolerable to the personality; perhaps, also, preventing a psychosis or severe neurasthenia.* The excep-

^{*} The severe hysterias (mutism, paralyses, deafness) usually had a better prognosis than either the neurasthenias or psychasthenias.

tionally great strength of the dissociative function in these cases derives from the fact that the men were living upon an instinctive plane and consequently that the dissociative process functioning purely developed an exceptional potency.

Rivers discusses the problem of dissociation in its genetic He points out that the caterpillar in the larval stage builds up a highly complex group of experiences, which, if they persisted in the butterfly stage, would render many of the important functions of the butterfly's life, such as flight, for instance, impossible. Another example he takes from the frog, showing that memories of the aquatic period of its life cycle would tend to produce reactions having a very disturbing effect upon the adult life of the animal. He compares these with the same facts in human life, stating that many modes of infantile reaction must be dissociated in order to make possible the behavior characteristic of adult life. The experiences which must be suppressed, he says, belong to the domain of instinct. becomes a question, he continues, whether dissociation of the mental life of man is not a mode of reaction belonging originally to instinct and which has been later utilized by the intellect. He states in closing his discussion: —

Experience becomes unconscious and persists in this state because nature is accustomed to utilize the process closely associated with instinct to put out of action instinctive modes of behavior which would interfere with the proper working of a mechanism formed through the combination of instinctive and intelligent modes of recollection.

The basic nature of dissociation is delineated by the vivid manner in which it cuts its way through the whole mental life. The dissociative process servile to the instinct of flight² (the emotion of fear) thus removes from the active memory big batches of experience, in many cases six or eight months of the individual's life. And similar workings are noted in certain other major instinctive facts of the human mind.

According to the behaviorists — notably Holt — "consciousness is response;" this emphasizes the motor aspects of mental or neural functioning. They would perhaps deny as superfluous the possibility of there being any such dissociative mechanism as the one described here, any "clearing-up-of-mind" process to aid its focusing upon the present content. Granted that a unified or integrated response constitutes the highest form of behavior and that normally we respond to one thing at a time:

however, under certain abnormal conditions, the mind is strained to seek to respond to more than one thing at once, with the consequence that fatigue or disease enters. In civilian life one can develop the capacity of having two ideas in the mind at once, — or for lesser periods one idea and some unrelated emotion. but two emotions cannot reside harmoniously for long without seriously affecting the individual's well-being. Then, in this abnormal state of overstimulation (or response), as these war cases illustrate, this dissociative process throws itself into the gap and rescues the mind from destruction. It serves a basic protective purpose, and its adequacy in preserving the individual is evidenced, positively, in cases where intolerable ideas or experiences were thrust from the mind. This is shown by the man who was picked up in Paris completely amnesic. At Base Hospital No. 117 he cleared up under treatment and told of having belonged to an outfit in which the men abused him horribly. Malingering was eliminated in this case. Negatively, one recognizes certain cases in which the dissociative process did not function, or wherein the stimulus overwhelmed the individual, as in the war psychosis. A typical case illustrating this is that of a lad whose buddie was decapitated as he was running toward him, and the head rolled at his feet. He picked up the head, put it on the body and told him to come along. Shortly thereafter he was hospitalized as a psychosis. The case entered Base Hospital No. 117 confused, with ideas of persecution and other psychotic symptoms, but with an ever-present vivid recollection of this experience, and was evacuated to a mental hospital some time later very little improved.

Memory is a by-product of experience, something closely related to habit both as regards origin and function; that is, they both come up from the instinctive sea and seem to function independently of it. There are the two facts, — instinct and habit. Instinct supplies the push to activity, — habits then are formed. Habits are not always developed, as in the case of the calf which is not given suck in time. The concept of order enters here to differentiate these two so closely related facts of instinct and habit. Habit never occurs without instinctive precedence.

Habits are by definition related to the operations of the skeletal apparatus and motor functions of the body, while memory, accorded a certain high dignity, is given a place in the thought life. Ordinarily, habits and memory reside harmoniously with instinct. Habit rides upon docile instinct, but one always feels

that the rider has a poor seat, that the least shock may throw him. In the community life of civilized man there are few causes for regression to the primitive planes of mental life. In war, however, this does not occur often, and we find that under the severe strains and trials of a campaign habits are as frail barks tossed by the raging sea of instinct, — instinct which has been dormant and which has not waned. So, just as habits are temporarily obliterated or pushed to one side by some very great emotional stress, so, likewise, may the instinctive functionings cast aside, shunt-off in some way, or, to use the term as Rivers employs it, "dissociate" the memory.

This summary discussion deals with a group of war amnesia cases in which the precipitating cause was the dissociative process of instinct; *i.e.*, of self-preservation (fear or anger), of the instincts grouped about the self (the "ego strivings") and of repulsion (horror). The latter two cases illustrate that although most of the war neurosis cases were related to fear, still there were cases whose origin seemed to be some other instinctive fact.

Case 1. — The patient's family and personal history are negative. Entered Base Hospital No. 117 about the 15th of September, 1918, and at that time had a complete amnesia for all events from the morning of April 11, 1918, up to and including October 25. The last event that he remembers prior to the onset of his amnesia was landing in Liverpool and the first part of his march from the docks to the train. The intervening six months and fourteen days were a complete blank, and his first recollection after this amnesic period was being arrested by one of the military police whom he told he was looking for his lieutenant, but to whom he was unable to give the name of his division or company or their geographical location. The patient was interviewed daily for eight days, an effort being made to restore the lost memory by means of association. Because all events prior to his landing in England, that is, including his early life, his occupational and school history and military life, were intact, - but the patient could not by associative methods go beyond experiences on arriving at Liverpool, — the patient was subjected to hypnosis and the entire memory restored in about two hours.

The points of interest that occurred during the amnesic period are as follows:—

The patient landed in Liverpool April 11, 1918, marched from the dock to the boat for Le Havre, arrived there April 15. Goes into detail in telling of various moves from that date up to July 18 when they were in position along the Marne River just to the right of Château-Thierry.

He was in reserve at Château-Thierry and was relieved July 31 and sent to St. Mihiel where he was held in a reserve position for the big drive. From that salient, they were moved by auto trucks to Souilly. Here he was transferred to the second battalion of the Fourth Infantry. On the second night his battalion moved up and relieved the first battalion. patient was not called, and the next morning when he got up he found that he had been separated from his company. He states: "I looked around all day but was unable to locate the outfit. At night I returned to Montfaucon and slept. The following morning I returned to the train to go up with the 'chow detail,' but it had already gone. I looked around until about 1 in the afternoon for my company, but without results. I then returned to the train and Lieutenant Gamon, the officer in charge, showed me where he thought my company was located. A detail was going up to them with chocolate and other things so I started out with them. We could not go through Montfaucon as Fritz was shelling it, so we took another road. Some shells began dropping on the road, so we lay down and waited for him to ease up. After about fifteen minutes he stopped. There was only one of the men besides myself in sight, and we disagreed on which way the others went so we separated to look for them, but I soon decided not to bother looking for them but to go on with the company. They had stopped shelling the town so I went back and through. I left the road to cross the field to reach the woods where the company was located. As I crossed the field I saw a man coming toward me. I did not recognize him as a friend, only as one of the company. When he was 20 feet from me, I heard a shell coming and lay down. shell struck him in the neck and knocked his head off and buried itself in the ground about 2 feet from me. As I lay there on the ground waiting for the shell to explode, I could do nothing but look at his head. I was never so frightened in my life. I do not know whether I was more frightened of the head or whether it was expecting the 'dud' shell to explode. Anyway, it did not explode. I tried to get up but could not for I was so weak I could not move. I remained there I suppose five or ten minutes, but it seemed like several hours. After a while I got up to go on to the camp and a shell came over. I did not hear it coming. There was just a puff of smoke, then darkness. When I came to I was about 8 feet away from where I was first lying. I remember nothing else until the military police arrested me when I inquired for Lieutenant Gamon. I do not remember whether I went on to look for the company or whether I turned back. I believe it was the next day that I was picked up by the military police."

The foregoing is a very brief abstract of what was obtained from the patient while he was under hypnosis. It was extremely difficult at times to get all the facts as he was very reticent about giving details about the Château-Thierry and St. Mihiel engagements. He showed little or no emotional reaction until he came to the event which precipitated his amnesia, that is, seeing the head of his comrade blown from his shoulders. At this point the patient showed what was presumably the same emotion that he experienced during the actual event, showing all the physical and mental manifestations of terror.

An interesting question arising here is whether the physiological accompaniments of fear — cessation of respiration and heart beat, paralysis of bodily movement, glandular, hyperactivity and so forth — are sufficiently potent to produce unconsciousness. Of course there are numerous incidents in civil life where persons viewing accidents faint and may remain unconscious for some time. This is probably what occurred (with the added fact of concussion). And later, upon return to semiconsciousness with the recurrence of emotional excitement, the dissociative process related to the self-preserving instinct asserted itself by eliminating with one effort the whole of the patient's memories of his experiences after arriving in Europe.

Case 2. — The patient was born in Rice Lake, Wis., 1892. Joined the Army September, 1915. Went to France June 28, 1917. He was admitted to Base Hospital No. 117 July 10, 1918, with a complete amnesia of all events prior to June 10. On this date he states: "The first thing I remember is feeling very nervous and excited because I could not remember. I was in a compartment on a French train. I asked if any one could speak English and found that there was a woman in the compartment who could. I asked her where I was and how long I had been on the train and she told me that the next stop was Cherbourg and that I had been on the train since 1 o'clock. It was then 5. I got off the train at Cherbourg and inquired of the military police where there was a hospital. I was sent to an English hospital where I remained about ten days. I was visited by both American and English specialists, but nothing was done for me. I asked to be transferred to an American hospital. I was sent to No. 8 General Hospital at Rouen and later transferred to Base Hospital No. 117." The patient states that while he was in the British hospitals he suffered terribly from headache. "Whenever I tried to think, my headache became worse."

This patient, for the first week in Base Hospital No. 117, was seen daily, probably on an average of an hour and a half. Every effort was made to restore his memory, but without success. He made a very earnest effort to discuss the war and places of battles with the other patients and frequently stated that he had remembered some particular place or name, but these things were simply isolated subjects and seemed impossible to associate with others. At the end of a week, the patient was hypnotized and the following history was obtained:—

He came to France June, 1917, began training July 14, and trained up

until November, 1917, at various places. At this time he went to Luneville front. He left this front December 12 and was in reserve until June 14, 1918, when he was transferred to Lorraine front. On February 6 he was sent to the hospital at Toul, suspected of having influenza. Here he met a Red Cross nurse with whom he became in love. The 1st of March. while they were out walking, the alarm was given for an air raid. patient and the nurse decided to return to town, but when they got to the crossroads, which was a short way from the hospital, she decided that she would go immediately to the hospital while the patient would return to his barracks. She had started about 15 feet on her way when a bomb dropped near by, knocking both of them over. The patient was not injured but only dazed for the moment. When he got up he went to the nurse and found what he supposed to be only a moderately severe wound of the arm, although she was unconscious. She was taken to the hospital in a cart and he requested that he be notified in the morning regarding her condition. At 6 o'clock the next morning he received word that the nurse was dead.

This news was a terrible shock to him. He became very emotional, cried and took no interest in anything about him. He was incapacitated for duty for several days, and then there suddenly came a great change over him. He began to resume his natural attitude toward life. He seemed happy and gay. He never referred to the unpleasant incident and nobody mentioned it to him. He did, however, claim to have hazy spells which lasted just for a moment. He became slightly confused, but this did not prevent him from doing his work efficiently, and the spells passed away within a short time.

The death of the nurse seems to be the beginning of his amnesic period, but other events occurred which confuse the issue to some extent. He was put on detached service as an orderly for Captain Brown, and while they were returning from Paris to Abbeville and had just arrived at the latter station, he was in another air raid and was concussed. This was about the 25th of April. He remembers waking the 1st of May in a hospital, but with a complete amnesia for all events prior to that date. From that time on he was transferred from one hospital to another. On June 9, while being transferred to Rouen as he thought, he stopped off at Securingea and there met several of the Allied soldiers. They began drinking, and the next thing he remembered was waking the following day on the train at 5.

The particular points of interest in this case are: first, the psychic trauma which followed the death of his fiancée, then the concussion resulting from the explosion of the bombs in the station at Abbeville, and, later on, the overindulgence in alcohol and its immediate effects.

In many of the neurotic symptoms of a serious nature, like amnesia, there tends to be a habit factor involved. The first onset of the symptoms derives from some severe instinctive (emotional) episode. Just as in all phases of normal habit-formation, the initial act comes of an instinctive impulse, — the instinct to walk protruding into the individual's life and bringing about the habit of walking, — so, likewise, many neurotic symptoms originate or are "first performed" as a result of instinctive pushings. Fear impulses, for example, accumulate. Paths of response are blocked. Vicarious expression in neuroticism results, the consequent neurotic habit being formed. Recurrence of neurotic symptoms then resolves into the general problem of habit. In this case, as in many others, any new severe emotional stress may again result in amnesia; and, as a matter of fact, this did occur in this case. There were three separate items of amnesia, the last being complete; two strong chords, and then with the eau-de-vie, a grand diapason.

The first amnesia developed from the emotional crisis following the death of his sweetheart. The later ones, followed after this first pathfinder. Originally a vicarious instinctive expression, it then developed into a habit. The prognosis in this case would be that any serious conflict in the patient's life would result in the recurrence of his amnesia.

CASE 3. — Sergeant in 111th Infantry, an unusually good type of soldier and giving an excellent family history, entered this hospital late in October, 1918. At that time his amnesia was complete from early in May, when he arrived in France, until late in October, when he was incapacitated and went through several hospitals.

He remembers a movement of troops on the 4th of July. On that date they went into the line at Château-Thierry, and the patient recalls having said to himself, "I shall never forget this day, for I am an American soldier in a foreign land, going to the field of battle on July 4. This is the greatest experience of my life." He remembered certain few other facts connected with this experience. He remembers coming into a town, over a bridge which spanned the Marne. The Germans were trying to "get" the bridge, and they lay in cellars for protection. That night the patient took the first 12 men over the bridge and got them all over safely. Shells were landing on either side; there was no opportunity to turn back, so he kept on going, and turned to the right. They went up a hill and into a big estate on which was a big mansion, and there were many statues and monuments, some of them broken by shells. They went into the mansion through a door which was open, and found French troops there. Some were sleeping and some were eating. They sat down to await further orders, the patient being near the door.

His other remembrance is of giving an order to advance in the Argonne on October 8 and certain unpleasant experiences related thereunto. He

says: "I started with 140 men and only 18 came out, of which number I was one. The last thing I remember is bandaging the arm of a corporal and trying to help him get back to a first-aid station.

"The battle in which I gave the command to advance occurred on a very clear sunny day, starting just after dawn. I gave the order to advance; we reached our objective and then changed our position several times. On sending for reinforcements, which I did several times, word came back to hold at any cost. Finally, I realized that no reinforcements could come. There were troops in back; runners came giving reports of what bad shape they were in. The men were dwindling all about me. They were practically under machine-gun fire all the time. I was never touched. I was excited. It seemed impossible that I alone was in charge."

He was bandaging the arm of his corporal when concussed by a shell. His next recollection is an incident in a base hospital.

"When I think it over, I would feel lots better to be wounded. A wound is an honor. This (Christ) is a disgrace (referring to neurosis).

"I led and instructed these men. They liked me. I took pride in commanding them. I can command men. I know it. I have proved it. You get to liking your men, a good 'non-com' does. It is not love and yet it seems like it. Oh! I hate to think of what may happen if I give them another order. I am afraid for them, not for myself. I am afraid to order them anywhere because they will suffer, not I."

He dreamed each night that the folks of these boys were pointing their fingers at him accusing him of the death of their sons. He remembers that he wondered why he was not hit when every one around him was falling. He wanted to be wounded to show that he himself had gone through as much as they. But to go home unwounded and meet the folks of the men that he had ordered forward was more than he could stand.

This case is interesting, showing, as it does, the working of the instincts associated with the self, or what might be called pride or self-regard. In this case it is a man of unusually good family traditions, he being of an old American family which had taken an active part in all previous wars and who expected that he, too, would bring honor to the family name. Then, also, besides his pride of family, he himself had as faith, an utter contempt for cowardice, the belief that cowardice was the greatest evil of which a man was capable. He believed that a man should resent any implication of cowardice. He did, as a matter of fact, punch a sergeant in one of the hospitals who passed a remark implying that he was "yellow."

There is a striking characteristic of the case in that the patient's amnesia was broken through by two facts: first, the July 4 incident at which time he had made the auto-suggestion

of never forgetting; second, that the painful incident in the Argonne, which above all others he sought to forget, he remembered. This seems to point to countercurrents of motives: one to forget, one not to forget, — pride remembering to display the self (Château-Thierry, July 4) and to abnegate the self (Argonne incident), — and maybe self-preservation or self-defense seeking to obliterate the whole of the unfortunate war career, unsuccessful because of his poor leadership (although he himself was obeying orders!) in the Argonne.

The patient's difficulty arose from the conflict of pride — the feelings about his family name and his honor as a soldier, — with fear and horror derived from the awful situation in which he was placed and from the great losses suffered by his men. He was concussed when in the throes of these emotions, and the later functioning of the dissociative process not only obliterated them from his mind, but tore a great rent in his memories which took in all his experiences in France, except the two mentioned above, — one of which (the Argonne incident) returned to him in a dream.

In this case a rather interesting symptom was certain spells which the man had from time to time — lapses of consciousness. These may be attributed to activity of the lost memories trying to reassert themselves in the conscious life. Vague morbid feelings in these cases are generally related to the smolderings of hidden memories. Usually in amnesia cases the patients spoke of "clouds" passing before their minds. One case of complete amnesia caught a fact from one of these vague visions, — he made out a brown helmet and became very emotional. He was urged to look hard and get more. Did so. Saw brown men and a woods. After several hours' work with him, urging and assuring that he could get his mind back, his memories were largely recovered.

In the great majority of war amnesias, especially those following upon concussion, there was a residual amnesia period which could not be recovered. This usually related to the time following the concussion and before they came to themselves in a hospital, a period of varying length during which they were dull or confused.

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SIGMUND FREUD, PESSIMIST.

BY E. E. SOUTHARD, M.D.

It was between trains that I made a small discovery concerning Freud which has a certain bearing on the war. The discovery some might think a truism, namely, that the genial Freud is, philosophically speaking, a pessimist. The bearing of this discovery on the war consists in the fact that Freud's lucid avowal of his philosophical pessimism is made an article published in wartime (1915) in a special journal "Imago."

It was between trains on a trip to Washington that I was about to fall asleep in the great heat when Freud's little work on "War and Death" floated to the top of the war literature. I sat back contentedly and read with satisfaction the translators' preface with its amiable talk about "advancement of the cause of international understanding and good will." It was that amiable physician, Dr. A. A. Brill, and a "New Republic" contributor, Mr. A. B. Kuttner, who were to give me the end of a perfect day in their authorized translation of Freud's essay, first published in 1918.

I turned the leaves and was for the moment almost lulled to sleep by the serene breadth of sundry observations which seemed to lap England and Germany together in a sort of Freudian embrace of an almost millennial tone. I kept thinking how the international understanding and good will were going to be advanced, and I wondered how Freud could make such a terrible arraignment of Germany and survive, even though his words were written in 1915. I assumed that the "authorization" of the very pretty translation which Messrs. Brill and Kuttner had provided must have come before the American declaration of Yet, perhaps, the translators' preface had been written Upon reflection, I could not quite convince quite recently. myself that either Freud or his esteemed translators had pro-German propaganda in mind, even (as they might say) unconsciously. Evidently Freud was bringing some of the phenomena of the great war into the scope of his special views, and evidently his translators had been so astonished by the depth of the Freudian admissions concerning German immoralism (even in an essay published as early as 1915) that they felt it was high time to show how a real philosopher looked upon these mundane

happenings. This opinion of the translators seems well established by the text of their brief prefatory note, which for its propagandist value I reproduce:—

This book is offered to the American public at the present time in the hope that it may contribute something to the cause of *international understanding and good will* [italics mine] which has become the hope of the world.

A perusal and reperusal of the essay is well worth while, as indeed of any Freudian essay. Remarkable for its lucidity, well translated, the essay is, in sooth, an interesting and important one; but I had not advanced far in its reading when the desire for sleep forsook me and I began to rub my eyes with astonishment. For the thesis which Freud here maintains may be concisely expressed as follows:—

Those who are not selfish and cruel are hypocrites. Selfishness and cruelty are the indestructible elements in man to which, repressed by civilization, we regress under the influence of war.

Below I shall offer quotations from a portion of Freud's essay to prove that this is Freud's thesis. But before coming to these details and before speaking of their propagandist value, I feel minded to point out that, should I be able to prove my point, Freud stands self-confessed as a philosophical pessimist of a very familiar, nay, even banal sort. I fancy, indeed, that Freud would himself cheerfully concede the point. He would probably say that not to proclaim oneself a pessimist, philosophically speaking, is to be a hypocrite.

Perhaps the translators are right. Conceding for the moment that Freud has been proved to be a philosophical pessimist, may we not remind ourselves that many well-known pessimists do see the "hopes of the world" in an understanding of the world's basic evil? Granting this, may we not give ourselves leave to doubt, however, whether the world's good will can ever be gained for the pessimism of philosophers. That evil exists, all concede nowadays save the Christian Scientists, who themselves have a way of putting a demon in the cathedral walls in the shape of Malicious Animal Magnetism. But the M. A. M. of Freud is far more thoroughgoing; for him the world is at bottom a world of selfishness and cruelty, upon which the illusion known as civilization rests like a thin and delicate film, only to be dissolved at a slight touch of reality.

But are we entitled to think of Freud as a pessimist in the

same sense as we think of Voltaire, of Rousseau, and of Schopenhauer, those giant pessimists of an older generation? Or, descending to a more recent day, are we entitled to align Freud as one of the minor pessimists with v. Hartmann and Nietzsche? I know many amiable Freudians, including the medical translator of this book, and I know that in their daily lives they are cheerful souls, and some of them as merry as grigs; but so far as that goes, Voltaire and at times Schopenhauer were mirthful and gay; and it is well known that confirmed pessimists get a tolerable joy from their views, or despite them. Is, or is not, Freudism a form of pessimism? If so, and if the Freudian contentions concerning this war and the abolition of "ethical restrictions" which characterizes it are correct contentions, then we must indeed look to our philosophical fundamentals to justify a continuance of this or any war.

After reading this book, in short, we may very possibly understand the war better, but we surely cannot like it any better. I am reminded here of a celebrated remark by (that contradiction of terms!) an English Hegelian, Mr. F. H. Bradley, to be found in the preface of his metaphysical work on "Appearance and Reality." Mr. Bradley had resurrected a note from his commonplace book and put it in the preface:—

Where all is rotten, it is a man's work to cry stinking fish!

In his apology for the great war, Freud may have done a man's work, but it is a little trying to have the stench cry to the heaven of our good will!

But are not Messrs. Brill and Kuttner right in their hope, and am I not wrong in believing Freud a philosophical pessimist? And, secondly, even if Freud is a pessimist philosophically speaking, is Freud not right, and will not "the cause of international understanding" be forwarded by our acknowledgment that Freud is right? It will be profitable to separate these questions.

Is, or is not, Freud a pessimist? I cast him above, along with v. Hartmann and Nietzsche, for the part of a minor pessimist. I mean no disrespect by the term minor: but surely all three of these philosophers are yet remembered by too many men for their mere personalities to allow us to add them to the heroes of philosophy. Moreover, being a minor pessimist is consistent enough with being a major contributor of something else to the world. Thus, v. Hartmann stood for at least one of the many varieties of the *Unconscious* which he defined clearly enough.

And Nietzsche got up the Will to Power, which (though Nietzsche castigated Germany in the best possible German style) is thought by some to express best of all the present aims of Germany. Again, Freud appears to have added dream-study to the technique of psychopathological analysis, and this contribution may well stand forever as an important one, when his pan-devilish Unconscious, his erotic symbolism, and his homuncular mechanisms have shrunk to minor proportions or to nil. Let us hand to Freud, what assuredly belongs not to Nietzsche, the palm of clarity.

But is, or is not, Freud a pessimist? As hinted above, I fancy that Freud would himself grant that he is a philosophical pessimist. As for the Freudians, I find that they do not always go the whole way, and I do not know quite what they will declare. Freud himself certainly plumps for what he plumps for, whether it be sex or the Censor, dreams or Germany.

I want now to recall some of the well-known facts concerning the history of pessimism that might apply to Freud. But in order to hold his thesis in mind and test it by comparison with the outstanding pessimism of the past, let us listen to some of Freud's remarks. I paraphrase from an early point in the essay (pages 16, 17):—

Civilization is an illusion dashed to pieces by collision with a bit of reality.

Again (page 30): —

"States and races" have in the war "abolished their mutual ethical restrictions," so that they have been observed "to withdraw from the pressure of civilization."

Again (page 15): —

"Our conscience is not the inexorable judge that teachers of ethics say it is; it has its origin in nothing but 'social fear.'"

Again, we find (page 28): —

"Civilization built upon hypocrisy."

Again (page 28): —

One is a hypocrite who "reacts continually to precepts that are not expressions of impulses."

I shall below try to give some idea of the logical connection between these statements, but before doing so, let us get in mind the philosophical pessimism of history. The following parallel columns give a rough idea of the history of these developments down through the great names of Hegel, as optimist, and Schopenhauer as pessimist. Note that some names, as Plato, Rousseau, Kant, Darwin, appear in both columns, either because their points of view were double or because their conclusions have been used by both parties.

> Major Optimists. Plato. Stoics. Leibnitz. Rousseau. Kant. Hegel.

Major Pessimists. Plato. Epicureans. Voltaire. Rousseau. Kant. Schopenhauer.

Darwin. Darwin.

My suggestion now is that we can offer a list as follows of -

Minor Pessimists.
v. Hartmann.
Nietzsche.
Freud.

As to pessimism, like most things philosophical, the historians carry it back to the arch optimist Plato. Plato thought that, on account of the connection man had with his material body and with the world of sense, the life of man had evil thrust upon it. The eternal good of Plato was accordingly limited by this material element of "non-being." The Epicureans and the Skeptics took up this pessimistic factor in the Platonic account, and, dwelling upon the actual bulk of pain and evil in the world, thought to confute the ethics of the Stoics, who had followed the more optimistic main line of the Platonic conception. In fact, the Epicureans were more empirical than philosophical in their pessimism. The man of the world acknowledges the existence of pain and evil; the Epicurean simply found that pain and evil bulked larger in the world than the goodness of it and hence were obliged to be empirical pessimists.

No great contribution to the philosophy of pessimism appears to have been made from the time of Plato's pessimism, as expressed, for example, in Book X of the "Republic," until quite modern times. Voltaire wrote in three days his famous novel "Candide" in ridicule of the idea that our world is the best of all possible worlds, and perhaps it is unfair to ground a philosophical pessimism upon what was intended to be a mere skit. Still, the Voltairean contentions were at least symptomatic of the views of many in his time, and possibly became the views of his patron

and pupil, Frederick the Great. Marshal Foch has pointed out how France introduced nationalistic warfare into the world in the Napoleonic era, and how this kind of warfare has come back to plague France. It is equally true that the notions of the French pessimist Voltaire may be said in the person of Frederick the Great of Prussia also to have come back to plague the land of their origin. As opposed to such pessimism as that of Voltaire is the optimism of Leibnitz, as expressed in his "Theodicy."

In contemplating the views of Epicureans and Stoics, of Voltaire and Leibnitz, the psychiatrist is inclined to inquire how much of mental deviation may lodge in these philosophers, particularly in the pessimistic persuasion. I suppose that it must remain doubtful whether Voltaire was an out-and-out psychopath. That he was "all intellect" and somatically an odd stick may stand without question. On the whole, however, it remains far more doubtful in the case of Voltaire that he was psychopathic than it remains in the case of his successor, Rousseau. As for Rousseau, it would be a pretty inquiry how far his views were not merely colored but manufactured by his psychopathic temperament. According to Rousseau, man was naturally good but rendered evil by culture. Accordingly, Rousseau started his back-to-nature cult and made many a princess try her luck as a shepherdess. He is a man whose contention may be placed on both sides of the account. Rousseau is in one sense an optimist, in another sense a pessimist. It may be observed that his view is in one sense the inverse of the Freudian view, for according to Rousseau man is by nature good and by civilization rendered bad; whereas for Freud it would appear that man is by nature bad — that is, a compound of selfishness and cruelty — and that we can only hope for a little "sublimation" by the obscure processes of history.

Kant was doubtless greatly influenced by Rousseau. Whether Kant was psychopathic is as doubtful as in the case of Voltaire. However, he underwent a temperamental change in his life. From being a confirmed optimist, he appears finally to have become a believer in a radically base element in man, an element so extensive and important as to warrant Kant's being regarded as, if not a pessimist, nevertheless a father of pessimism.

As for Hegel, he assuredly regarded the world as evil if it was viewed statically in a cross-section at a given time. But the world in process, the world of actuality, was for Hegel a good world, and he has had many followers in the attempt to prove

that evil is somehow good. Kant's view had run in somewhat the same direction. For Kant had been an optimist in regard to the potentialities of man, though a pessimist in regard to the present situation. - Though man had a good motive in him, namely, the rational and universal motive of humanity, nevertheless the tendency on man's part was to make his motive of action out of mere self-love. To be sure, in a state of nature, both Kant and Rousseau felt that man had good natural propensities, rather naturally fitted to the ends of man. He was, as it were, in a sort of Garden of Eden, in a physical state of Paradise and in a moral state of complete innocence. It was, perhaps, not a snake which caused his fall, but it was something equivalent, namely, Consciousness. When a man grew conscious, according to Kant, he found he had a will, and by means of this will he got away from the natural law that governed his instincts. Through the operation of this will of his, man became evil. If civilization and culture are a product of the natural desires of man, then civilization and culture become non-natural affairs. Nature and culture are in conflict. The individual turns out to be necessarily unhappy in this situation. It was not up to history to make the individual happy. History's plot was to perfect humanity as a whole. In the process of this perfection, we were going to suffer tremendous conflicts and pain.

Hegel now took optimistic lines: somehow history was perfecting humanity. Perhaps it would not be too flippant to consider that Hegel felt that it was Germany's part to secure through history the perfection of humanity. We Anglo-Saxons, and of course also the clear-headed Latins, are a bit amused at this curious idea of Germans as the chosen people, but one does not feel that Hegel had any particular sense of humor in this regard.

Whereas Hegel laid hold upon the perfection of humanity in point of time, Schopenhauer laid hold of the Kantian notion of the will. Man, according to Kant, found he had a will and became through this will evil. There was a radical evil in the nature of man, of which for Schopenhauer the best account was that it was somehow the will. The rest of the Schopenhauerian story is to be read in every textbook of philosophy.

V. Hartmann now laid hold of the will concept and developed from faint beginnings in older philosophy the semi-mystical concept of the Unconscious, a concept which is used to this day by the Freudians. V. Hartmann himself, despite his tremendous vogue and modishness, appears to have been a lucid critic, not only of other people's notions, but also of the Unconscious, and has left an analysis of the types of the Unconscious used by the different philosophers to the number of seventeen! That there was anything psychopathic about v. Hartmann that influenced his work is doubtful, though we may give full credence to the idea that temperament played a part. Darwinian notions had now become current. The Darwinian evolution could be used effectively by Herbert Spencer as an argument towards a millennium, and from that point of view one might regard Darwinism as a quintessence of optimism. But the pain and annihilation suffered in the struggle for existence might well lead to the employment of Darwinian concepts for the purposes of pessimism, and this it would appear has been the special task of many German authors. One seems to see in Nietzsche distinct traces of this use of Darwinism. While Sir Francis Galton was quietly developing his Viriculture and his noble concepts of Eugenics, Nietzsche was, on the other hand, depicting the ideas of the Blonde Beast and the Superman. Elements of logical identity might be found for these Galtonian and Nietzscheian ideas, and the psychiatrists would be tempted to lay to the matter of temperament alone much of the difference between a Galton and a Nietzsche.

The Massachusetts Commission on Mental Diseases recently purchased a set of the works of Nietzsche, and the sober and astute financial officers of the State could find no fault with the purchase of such excellent psychopathic materials: Could not the State research officers profit by a direct study of the works of Nietzsche as much as by the study of case records from their hospitals? As in Rousseau, so in Nietzsche, we find obvious psychopathy. Perhaps it is even more obvious and more thoroughgoing in its effects in the case of Nietzsche than in the case of Rousseau. Nietzsche, born in 1844, appears to have been clearly psychopathic as early as 1876, and became obviously insane in 1888, dying only in 1900. Of course it may be pointed out that Nietzsche revolted against pessimism and really in a way inverted the views of Schopenhauer. He wanted life led vigorously just because it was painful. Nietzsche had in himself enough psychopathy to study. Schopenhauer had studied the relations of moral and physical at the Berlin clinic of the Charité. In the twenties Schopenhauer had kept loaded weapons at his bedside. These two great pessimists in the history of philosophy are, beyond all question and cavil, psychopaths. Shall we not draw a lesson from their psychopathy and seek, among other milder, milk-and-watery pessimists of a more modern day, the causes of pessimism in temperament?

In this wholly superficial analysis of the history of pessimism, whose main facts lie at the surface of every historical work, I do not mean to argue for or against the truth of pessimism. The decidedly healthy mind of William James found "a deep truth in what the school of Schopenhauer insists on — the illusoriness of the notion of moral progress. The more brutal forms of evil that go are replaced by others more subtle and more poisonous. Our moral horizon moves with us as we move, and never do we draw nearer to the far-off line where the black waves and the azure meet." ¹

One of the best popular accounts of pessimism is in James's essay "Is Life Worth Living?" James there points out how "Germany, when she lay trampled beneath the hoofs of Bonaparte's troopers, produced perhaps the most optimistic and idealistic literature that the world has seen; and not until the French 'milliards' were distributed after 1871 did pessimism overrun the country in the shape in which we see it to-day." And no doubt there were political and economic factors in the development of the pessimism of modern Germany. In another portion of "Is Life Worth Living?" James speaks of speculative melancholy as not necessarily an outcome of animal experience. He speaks of it as possibly the "sick shudder of the frustrated religious demand."

With respect to both Nietzsche and more modern pessimists one wonders how far this insight of James really carries. Certainly in Germany itself at this time there appeared to be tremendous readjustments in the attitude to religion, out of which one gets the impression that a frustrate state of mind must come. James regards pessimism as essentially a religious disease. He elsewhere defined it as "consisting of nothing but a religious demand to which there comes no normal religious reply."

Where there is no free will there is apt to be no religion, and pessimism has usually, though not always, allied itself with a philosophy which denies free will, namely, with determinism. Some provision for free will or the importation of novelty into the world, some concession of indeterminism, seems to be required for the religious man. Freud can probably be shown in all his works to be a determinist. That he is always so obviously a pessimist as his essay on "War and Death" implies, I think we cannot be certain. But is it not clear from even a superficial

analysis of the history of optimism and pessimism that Freud is, historically speaking, nothing but another bead on the string of pessimists? Is he not using the most frequent tool of pessimism, namely, a world system without free will, without (so far as I can see) the operation even of absolute chance in the sense of Charles Peirce? A world system which employs that Jack-of-all-trades, the Unconscious, to secure results which a deterministic or fatalistic formula would not readily secure?

Of course, one must insist that determinists are not necessarily pessimists, and vice versa. As James acutely remarks, "Our deterministic pessimism may become a deterministic optimism at the price of extinguishing our judgments of regret." If we cease regretting and let bygones be bygones, we shall not need to be pessimistic. Neither v. Hartmann nor Freud has quite the "wild-eyed look" at life which James charges the pessimist with having. Schopenhauer and Nietzsche, obviously psychopathic, may readily answer to the charge. On the whole, however, one feels that the world of Freud as expounded in the last twenty odd years is a somewhat wild-eyed world, a "nightmare view of life," as James elsewhere expresses it.

In this new essay on "War and Death," Freud, however, seems really to have let the pessimistic cat out of the bag of mechanistic tricks. I return to some quotations from Freud's essay, which runs as above mentioned to the astonishing conclusion that everybody is a hypocrite who is not wholly selfish and cruel and that war tears the mask off this hypocrisy. War tears the mask off this hypocrisy whether it be a subjective or an objective one, for Freud opines that he has really found a novum genus of hypocrisy — objective hypocrisy.

Civilization, we saw above, is, according to Freud, an illusion dashed to pieces by collision with a bit of reality. Accordingly our disappointment over the war is, "strictly speaking [i.e., intellectually?], not justified, for it consists in the destruction of an illusion."

Freud writes avowedly as a German. He concedes that "science has lost her dispassionate impartiality." Would he grant himself one of "her deeply embittered votaries, intent upon seizing her weapons to do their share in the battle against the enemy"? Possibly. For, on a later page, Freud writes: "We live in the hope that impartial history will furnish the proof that this very nation, in whose language I am writing and for whose victory our dear ones are fighting [curiously enough, Freud is an Austrian, though he seems here to identify himself

with Germans], has sinned least against the laws of human civilization," and proceeds: "But who is privileged to step forward at such a time as judge in his own defence?" On the whole, however, Freud throughout makes a brave show of philosophical impartiality and cheerfully assigns to both sides an equal guilt in regard to the war's exposure of our (in Freud's eyes) fundamentally evil nature. "States and races" are described (pages 13, 2 and 30) as having "abolished their mutual ethical restrictions" so that they were seen "to withdraw from the pressure of civilization." Both sides, he seems to concede, are equally at fault. I take it that Messrs. Brill and Kuttner were astonished at so great a concession by a German as the concession of mutual guilt. May this not be the true explanation of that extraordinary preface by Messrs. Brill and Kuttner about contributing to "the cause of international understanding and good will"? A German, writing to be sure from Austria, concedes a portion of guilt as Germany's. Is not this a bit of a rapprochement? Is not the time approaching for a Gargantuan embrace of the nations, a Brobdingnagian kiss and makeup? This I can readily believe was a part of that which lies under that prefatory note. Another bit of underpinning is probably the belief that the world might well await the pronouncement of a Freud as a genuine oracle. For Freud has his votaries, and not the least of them is Dr. Brill.

Now, quite seriously speaking, I grant the oracle part and will not stoop to calling the stuff that emerges "Delphic"! It is lucid enough. It is important stuff also. But is it true?

Perhaps the most exact statement of the fundamental pessimism of man's nature is made in these terms (page 21):—

"The most pronounced childish egotists may become the most helpful self-sacrificing citizens," and "The majority of idealists, humanitarians, and protectors of animals have developed from little Sadists and animal tormentors," and, more summarily, "The earlier infantile existence of intense 'bad' impulses is often the necessary condition of being 'good' in later life."

Let us stoutly resist at this point the wish to doubt the cogency of all this logic and to question the accuracy of this psychology. Let us merely try to understand the implications of Freud concerning the pessimistic basis of many phenomena of this war.

Egotism and cruelty are primitive impulses in us (page 19). There is a "deceptive appearance" of altruism in place of egotism

(Messrs. Brill and Kuttner use "egotism," not egoism, here) and of sympathy in place of cruelty. Again, let us resist questioning the accuracy of the term "deceptive" in this transformation and let us rather try to get Freud's point. "We learn to value being loved as an advantage for the sake of which we can renounce other advantages" (page 21). Again, "The influences of civilization work through the erotic components to bring about the transformation of more and more of the selfish tendencies into altruistic and social tendencies" (page 22). Or, still more pointedly, "Our conscience is not the inexorable judge that teachers of ethics say it is; it has its origin in nothing but 'social fear'" (page 15).

But how and why is this transformation "a deceptive appearance" only? If it be a transformation, why is it not a transformation? Why does it turn into an appearance? Well, one reason is "ambivalence" (love, hate, etc.); but, passing over this sleight-of-hand, we learn that society's system of rewards and punishments does not always effect a genuine transformation. One person may, to be sure, be "always good because his impulses compel him to be so, while another person is good only in so far as this civilized behavior is of advantage to his selfish purposes" (page 26). Honesty is here the best policy with a vengeance! "We shall certainly be misled by our optimism into greatly overestimating the number of people who have been transformed by civilization" (page 26).

Still forbearing to question the facts or the uses to which the alleged facts are put, let us on. These prudential hypocrites, "civilization built upon hypocrisy" (page 28), ought, one might think, to be allowed the free and cold-blooded use of their algebra of worldly success. But, no! civilized obedience, even for selfish purposes, seems to put a strain on this majority group of untransformed egotists. They are somehow the victims of "a continual emotional suppression" (page 27). "There are therefore more civilized hypocrites than truly cultured persons" (page 28). As to these hypocrites, it does not matter (according to Freud) whether they are conscious of their hypocrisy or not. You are a hypocrite even if you do not know it — an "objective hypocrite" (page 28) — and you are in fact a hypocrite whenever you "react continually to precepts that are not expressions of impulses" (page 28). The only impulses in question, be it remembered, are those of selfishness and cruelty.

It is thus fair to say that those who are not selfish and cruel are

hypocrites. Those who are not selfish and cruel are victims of civilized suppressions. Hypocrites, whether conscious or not of their hypocrisy, are under a strain because they are not continually selfish and cruel.

Still not inquiring how true all this may be, let us ask how Freud makes it seem so to himself? It is because "the primitive psyche is in the strictest sense indestructible." The fact that psychic evolution is thus "unique" in the world of development does not stagger Freud in the least. Au contraire! For some reason Freud terms this alleged property of the psyche "plasticity." The indestructibility of the primitive psyche is just the plasticity of the psyche. Put otherwise, the (alleged) fact that selfishness and cruelty cannot be destroyed is an example of mental plasticity! The mind is "plastic" because you can always get down to selfishness and cruelty. In fact this vaunted plasticity is pretty much a one-way path of retrograde action or "regression." In fine, we poor mortals tend to selfishness and cruelty. Or, as one might say, man is cacotropic (a neologism of my own!). War creates these regressions, as it were hastens this cacotropic trend.

Selfishness and cruelty, or, more briefly, evil, is the indestructible element in man. And there is a pressure upon us, a "repression," when we get away from this indestructible evil core. In short, even the higher ethical processes are (here Freud might or might not follow me) in themselves evil, just because they produce these inhibitions, pressures, suppressions, repressions, hypocrisies. And, whether you feel any pressure of *Kultur* or not, anyhow aggression is your lot.

Well! what is to be the basis of international good will? Evidently whatever anybody in this war does is after all only to be expected. The Apologia Freudi pro bello maximo, as it might be called, is simply the Apologia maxima et simplicissima, viz., there is a radically base element in man to which he regresses in war.

With this blanket apology, let us now internationally be satisfied. The remedy? "A little more truthfulness and straightforward dealing" (page 39). Just what good this straight truth would do, I am bound to say I do not see; for all that we should clearly see would be that the evil in our psyche was indelible!

From all which one might veritably deduce that Freud was not only a pessimist, but a determinist. As apologist for the war Freud is, I think it may be allowed, a pessimist. It happens to

be to Germany's interest to follow the Freudian argument. As propaganda Teutonica, the essay is admirable. Though Freud himself may be philosophical enough to view quite impassively the minimal differences in regression he sees between the two enemies, eager propagandists will readily seize on one fact. Had this war not been started, then these gigantic repressions would not so soon have taken place. Hence, whoever started the war is responsible for it all. But the Teutons were centrally situated, so by nature on the defensive; hence the Entente is obviously at fault. Merely combine philosophical pessimism with anthropogeography, and the tale is told!

Intentionally or not, Freud, I hold, has so manipulated his pessimism as to make a subtle apology for the Central Powers, all the while parading on the high line of impartial weighing of both sides.

Both sides "have abolished their mutual ethical restrictions." Instances of their regression I find in Freud's pages to the number of twelve classes. I understand Freud to intimate that both the Teutonic and the Entente Allies have been guilty. I simplify by letting it seem that Germany and England stand for their respective allies in this wrong-doing.

- 1. England and Germany have regressed from that stage of community progress long ago reached by the Greek amphictyonies that forbade (a) destruction of a league city, (b) the felling of oil trees, (c) cutting off water supply (page 10).
- 2. England and Germany have not afforded complete protection to the wounded, the physicians, and the nurses (page 10).
- 3. England and Germany have not properly considered the rights of non-combatants, of women, and of children (page 11).
- 4. England and Germany have not in the processes of war sought to maintain the projects and institutions of international corporate life (page 11).
- 5. England and Germany have placed themselves above the rights of nations and all restrictions pledged in times of peace (page 12).
- 6. England and Germany have not respected the claims of private property (page 14).
- 7. England and Germany have made free use of every injustice, every act of violence, that would dishonor the individual (page 14).
- 8. England and Germany have apparently outdone the customs of previous wars in the degrees to which they have em-

ployed conscious lies and intentional deception against the enemy (page 14).

- 9. England and Germany have intellectually repressed their citizens by excess of secrecy and censorship of news and expression of opinion (page 14).
- 10. England and Germany have absolved themselves from guarantees and treaties by which they were bound to other states (page 14).
- 11. England and Germany have made unabashed confession of their greed and aspiration to power (page 14).
- 12. England and Germany have, by abolishing conscience (i.e., "social fear") caused individuals to commit acts of cruelty, treachery, and deception (page 16).

Freudism, if this account be correct, is certainly an extremist view of the universe; almost as extremist a view as that of Eddvism, to which allusion was made above. Why not ticket Freud pessimist and have done, just as we ticket Eddy optimist and have done? Why not use as practical physicians Freudism and Eddvism as alternative methods of cure by suggestion? the one hand, a suggestion that your native badness be now sublimated; on the other hand, a suggestion that your badness simply does not exist at all? The choice of patients for Freudian sublimation or Eddyan subtraction of morbific agents might then depend upon the temperament discerned in the patient. These would be the All-or-None (as the physiologists say) alternatives of a two-way system of psychotherapy — back to the doctrine of original sin on the one hand, back to the doctrine of original bliss on the other. We might counsel brunettes for psychotherapy, Freudian type, blondes for psychotherapy, Eddyan type. Or, possibly, thin persons ought to be psychoanalyzed, fat ones given absent treatment. Red slip: sublimate! slip: oblivisce!

Suggestion, Bernheim declares, is an idea accepted. Very well! Technique matters not, so the result be obtained. On the level of this broad definition the sage and catholic physician might choose to-day psychoanalysis, to-morrow Christian Science, for patients of different or shifting dispositions, on the sound psychological basis of the great polarities of man — towards pessimism, towards optimism. For the pessimist who is but half-hearted, a mere pejorist, we counsel thorough pessimism: In the great world evil, sink thy small soul's evil and know that, whate'er befalls, thou canst but slide briefly down to the garden,

known of yore, wherein grows the Tree of Evil! For the mere meliorist, him we counsel thorough optimism with its lotus leaves: Extinguish thy sorrow and all thy judgments of regret: Forget and know that what thou shalt forget exists not, nor know we how that ever did exist, saving only by M. A. M.

Some of these features I place in parallel columns: —

Eddyism.

Freudism. Materialistic.

Indeterministic.
Optimistic.

Idealistic.

Deterministic.
Pessimistic.
Good illusory

Evil illusory. But, M. A. M.! Good illusory.
But, sublimation!

Forget!

Recall!

Spiritual and absent treatment.

"Catharsis," intimate re-education.

Disease: delusion.

Disease: flight from reality.

I mean no disrespect to Freudism or for that matter to Eddyism in these parallel columns. One may regard Eddyism as a degenerate or pseudo form of idealism, a sort of backwater in the American philosophy of Emerson. One has naturally no design of denving the cures effected by Christian Science. As for Freudism, the logic is as finely drawn and complex as Mrs. Eddy's is coarse-meshed and simple. Eddyism is sectarian. Though Freudism threatened at one time to become sectarian, doubtless we now see a tendency to the utilizing of Freudian concepts in everyday terms. In fact, some are discovering that much of the novelty in many Freudian contentions lodges in nomenclature only. I am utilizing the parallel columns for the purpose of showing that any extreme optimistic view and any extreme pessimistic view is quite unlikely to be a sound view. At all events, the man who confronts the phenomena of Eddyan optimism and Freudian pessimism has the question sharply put up to him. What after all is the truth about this world? Is it a radically evil world or not? Evidently Freud believes and avows that it is, and on that ground can justify anything that even Germany could do.

I said above that we could well separate the questions, Is Freud a pessimist, and, Is pessimism so? I consider that I have sufficiently proved that Freud is a pessimist. But why should he not be?

Why should we not be philosophical pessimists if the primitive and indelible instincts of us all are those of selfishness and cruelty? The instincts! Here we could toss the ingenious Freud

in a number of logical blankets. I forbear! Whether my primitive instinct is not one of cruelty or whether I am buoyed up on a cloud of illusion, I forbear to show that Freud cannot tell some from all. We are all engaged now in trying to teach Pan-Germany that little distinction, some versus all! Freud, the subtle spokesman for Teutonic crimes, — can he really not tell the particular from the universal? Does he really think the one indestructible thing in man is a pair of instincts, selfishness and cruelty? Has he ever spent five minutes with books on instinct? Or, is he merely a special pleader, choosing as propagandist to omit mention of all instincts save those he wants?

A slight technical acquaintance with Freud's writings will, I assure the reader, show quite readily that Freud is perfectly capable of all the arts of logical fencing. I do not deny that Freud might, to prove an honest point, deliberately suppress a lot of little instincts that seemed to him trivial in comparison with selfishness and cruelty, e.g., such familiar instincts as gregariousness, constructiveness. Again, what does he do with selfishness and cruelty themselves: are they identical or not?

A truce upon such stuff, the pragmatic American wearily cries. No one really believes it. Freud is just the pepper of our substantial flow of soul. Freud is just the spanking we easy-goers perpetually need. There is a time for Freuding and a time for Eddying. Thus the pragmatic American.

But will said American ever wake to the fact that perhaps Freud really believes his talk and that perhaps the one good reason for Freud's believing is Freud's temperament? Will the American ever wake to the fact that perhaps the Germans, dear to Freud, really believe that everybody in the world is, according to the Freudian formula, a subjective or objective hypocrite? Will the American ever wake to the fact that, not militarism, but pessimism, not soldier-worship, but devil-worship, is the philosophy, the religion, of Germany? To the fact that, though every trace of the cruelty machine were obliterated, the selfishness machine would survive? To the fact that these Germans are of this subjective belief: that civilization is founded on hypocrisy? To the fact that all seeming proofs to the contrary are taken by the Germans as but tokens of a deeper hypocrisy?

Crush militarism out of Germany as we may, we shall not regenerate her so long as this Freudian formula of universal hypocrisy prevails. Voltaire with a laugh gave a "Candide" for a "Theodicy." Darwin, who read German with difficulty,

handed the psychopath Nietzsche some matériel which the psychopath Schopenhauer had not. The lucid v. Hartmann and the lucid Freud, apparently without a trace of psychopathy in them, serve symptomatically up to the modern German taste such philosophy as I have sketched above. Only a certain élite subjectively believed a v. Hartmann of yesterday or subjectively believe a Freud of to-day. But - let us borrow a little logical trick from Freud — if Freud can talk of objective hypocrisy, let us talk of objective beliefs! Germany, I consider, at times subjectively, but for the most part objectively, holds to the philosophy of pessimism. It will be Germany's fault, cried Nietzsche, if we do not get rid of Christianity. But why prod the poor Blonde Beast? Objectively he had already gotten rid of Christianity and all its likes. With a certain bravery the psychopath Nietzsche threw out the banner of the Wille zur He had painted the black lily of Schopenhauer with some foreign pigments. Darwinian were they - but "where all is rotten"! Hear ye, hear ye, O objective hypocrites! A little straightforwardness and truth! "Where all is rotten!" Live not in despite of evil: Live and will your lives to power not in despite of evil but because of evil.

Are the Germans psychopathic? The inquiry is open: They themselves have lodged the question, Is not France affected by the revenge-psychosis, *Psychopathia gallica?* No! No! soberly answered a German critic of this *Psychopathia gallica*. No! No! for in that case we should be compelled to pity France, poor morbid France! One does not indict a whole nation, even France, not even Germany.

I have not called Freud psychopathic; I do not call Germans psychopathic, much as I should like to pity him and them. I find him and them philosophically pessimists and believers in absolute evil. I consider that the most brilliant expressions of pessimism have been really psychopathic, witness Schopenhauer, witness Nietzsche. These men were temperamental extremes of a psychopathic degree, beside whose brave wailings the stuff of v. Hartmann and of Freud seems anæmic and banal. But — is it not always so? — when the psychopath leads, the stampede psychology of the mob is ever more violent. Why? I know not. Perhaps because the psychopath often expresses himself with abnormal clearness. Psychopathic sincerity is ever more persuasive than the common sort. Beware the clear issue! It is not real. The world is yet obscure. Who is this demagogue

who has (thank God for the word) doped out this transparency of thought? Voltaire tucked a little germ in. Rousseau rubbed it deeply into Kant, who grew old with it. Napoleon burned every soul with it. Schopenhauer psychopathically played with it and youth hugged the idea. Darwin gave them strength. The French milliards showed how goods might be delivered by the simple formula, Selfishness × Cruelty = Goods Delivered. Nietzsche got the whole thing out nude. V. Hartmann nicely draped the Unconscious over all. Murder will out: for the eloquent Freud it remained to blab the whole thing: The choir hypocritical!

They borrowed the airplanes, they borrowed the submarines — but *mirabile dictu* they borrowed their philosophy! One thing they did not borrow — the psychopathic weapon, gas. In like sense, from the psychopathic essence of pessimism found in Schopenhauer and Nietzsche, they did not borrow — the poisonous idea of universal hypocrisy.

But did I not say that I might inquire, Is pessimism so? Bah! after looking up a few of the instincts, e.g., in the ants, read a bit of Plato and enlist! All the while remember that some people, perhaps Freud, really believe the world fundamentally bad — mind, I say, really believe!

By the way, as I fell asleep over the Death part of Freud's essay (it was very hot on the way to Washington — think of all the nice fellows trying to be homothermous down there, that summer of 1918!), I dreamed a dream. Pace Freudé, it was about the Homeric Chimera. A Chimera is a Hypocrite. It is something of a Blonde Beast in front. It is, to be exact, a Lion in front. It is a Snake behind. It is midways a Goat. I seemed in my dream to be musing on orientation. The Snake seemed to be in Russia. In a dream you can see all around even a Chimera. The Lion part was roaring and bloody enough. The Goat part — Gambetta, Bryan, and I seemed to be pulling off a sort of Levée en masse together, when I woke up and lost a whole train penning these lines.

REFERENCE.

- 1. James, Wm.: "Will to Believe; Essay on the Dilemma of Determinism," 1884, p. 169.
 - 2. James, Wm.: "Is Life Worth Living?" p. 47.

MORBI NEURALES. AN ATTEMPT TO APPLY A KEY PRINCIPLE TO THE DIFFERENTIATION OF THE MAJOR GROUPS.*

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This paper is intended to be more modest than even its subtitle "attempt" denotes. The writers feel confident that a key principle, roughly reminding one of the principle of Gray's botany for the diagnosis of plants, is applicable to the diagnosis of nervous diseases. Central in the application of such a key principle is the idea of exclusion of diseases in diagnostic consideration by means of following a certain order. But granting the theoretical virtues of a key principle and of the method of orderly diagnosis by exclusion, we must remain uncertain whether the order adopted is the one best way, in the sense of the efficiency engineer who devised that term.

The attempt to apply a key principle to the differentiation of the major groups of nervous diseases was based on the comparative success of the application of an identical principle to the differentiation of the major groups of mental diseases. Since the publication of a key to the practical grouping of mental diseases, presented to the American Neurological Association in 1917, the principle of diagnosis per exclusionem in ordine has been presented to the Association of American Physicians in 1918, and in briefer form in a second paper on certain applications of the pragmatic method to psychiatry (1918). The idea of a possible extension of this principle of orderly exclusion to the problems of general medicine has met with the approval of Dr. Richard C. Cabot, who, at the June, 1919, meeting of the Association of American Physicians, displayed a tentative list (without definitive sequence) of the major groups of diseases in general. This list, as the sequel will show, may have some value for clinical neurology, and may even prove superior to the key to mental diseases formerly laid down.

DIAGNOSIS BY EXCLUSION.

Perhaps it is superfluous to argue here for the virtues of the key principle in the form of diagnosis per exclusionem in ordine.

^{*} Read by title at the annual meeting of the American Neurological Association, held at Atlantic City, N. J., June 16-18, 1919.

In a previous paper considerable argument has been devoted to the habitual underestimation of the values of the method of diagnosis by exclusion, of which DaCosta and his followers were guilty in the sixties and seventies of the last century. The method of diagnosis by exclusion was to be resorted to only in extremis, according to these authors, and especially according to the book on diagnosis by DaCosta, published in 1864, which was thought by some to have marked an epoch in the progress of internal medicine. The so-called indirect diagnosis or diagnosis by exclusion was, according to DaCosta, "not on ordinary occasions much employed, nor, indeed," DaCosta continues, "is it to be recommended." DaCosta thought that to prove what a thing is by proving all that it is not is a very tedious process. He went on to say that it was "difficult to think of all the possibilities" and remarked that "pathology was in an imperfect state." But its imperfections seem to us to interfere with all other methods of diagnosis as much as with diagnosis by exclusion. As for the difficulty of thinking of all the possibilities, the device of placing these possibilities in manageable groups (after the manner of the diagnostic groups of animals, plants and minerals, that is, after the manner of Linnæus), DaCosta and his colleagues in the single-volume textbooks of medicine did not conceive of such a process. Apparently, DaCosta felt that in the process of diagnosis by exclusion one would need to exclude theoretically every other disease than the one on which one would finally fix. As for the tediousness of this process of diagnosis, no doubt accurate diagnosis in difficult cases is and must remain extraordinarily tedious, but remains none the less interesting and important.

But diagnosis by exclusion is not diagnosis by exclusion in order. It is one thing to secure a list; it is another thing to make a sequence of the elements in the list. An aggregate does not forthwith throw itself into order, and especially not into that arithmetical arrangement called a "well-ordered" aggregate.

Now, as a matter of fact, it seems to us that most workers in difficult cases do actually employ something like what has been described as diagnosis per exclusionem in ordine. In correspondence with some specialists, affirmative replies have been given to questions on this line. Ordinarily, diagnosticians are prouder, perhaps, of making a diagnosis of smallpox by the sense of smell at 100 yards (more or less) than to make a careful, logical diagnosis by exclusion in order. Yet the most ex-

pert diagnosticians are reduced to using diagnosis per exclusionem from time to time. Even DaCosta admitted that the method had to be used on occasion. We hold that a method which has to be resorted to in difficult cases ought to be rationalized so that tyros and inexpert workers may the earlier learn to make correct diagnoses. We hold that the field of mental and nervous diseases is a good field in which to begin, because the majority of cases in these fields are difficult of diagnosis. pecially in the field of mental diseases is it true that there is practically no single pathognomonic symptom in the whole branch. Starting with a slant toward some disease in which a given symptom is characteristic, the tyro can prove from the very best textbook that almost any mental case he has in hand is or might well be a case of the disease he starts to prove it to be. The tyro is only caught up short when the laboratory comes to the rescue with pathognomonic signs. But the tyro with a slant rushes in where the laboratory expert fears to tread. On this account, as there are practically no indicator symptoms in the field of mental disease, the method of diagnosis per exclusionem in ordine was found to have especial value for the mental diseases.

We shall not here rehearse the situation in the mental disease groups. We may persist in pointing out, however, that, if eleven groups of mental disease have been laid down as of pragmatic orderly value in diagnosis, there is no reason why some other worker may not prove that there are twelve or ten instead of eleven groups. Thus one acute observer believes that there should be added to the eleven-group system, as presented, a twelfth group of paranoic cases. Another acute observer suggests that there are really no senile diseases, that properly obtain the name, at least among the mental diseases, and that consequently the senescent-senile group should be deleted from the sequence and its diseases distributed otherwise; for example, among the arteriosclerotic brain diseases, the manic-depressive group, etc. Let us insist, too, that not only may the groups be accordeonized, that is, interpolated and extrapolated without destroying the key principle involved, but the order of the groups may likewise be changed, possibly to advantage. Some considerations on this point have been given in the paper above mentioned on applications of the pragmatic method to psychiatry.

CLASSIFICATION OF DISEASES.

For those who are willing to consider a rationalization of the method of diagnosis by exclusion in order (a method which we are convinced that every one dealing with complex cases must in some form employ) there is another bogey of greater diffi-Pathology, as DaCosta might still remark, is in an imperfect state! Why classify diseases in any definite manner until we know more about the etiology and genesis of diseases? The answer to this objection is that in practical life some account of stock must continually be taken. Next year the very basis of some well-recognized disease of to-day may be entirely overthrown; even to-day we may recognize that the etiology or genetic basis of that particular disease is very shaky or rickety. Nevertheless, it remains our duty to make diagnoses on the best basis available; otherwise there will be no common ground of discussion with colleagues and no common ground for practical measures of treatment. Accordingly, the imperfections of present day pathology should not deter us from practical classifications. We must cheerfully admit that these practical classifications may be changed from decade to decade. mist or the worker weary in well-doing may regret the long string of obsolete and obsolescent classifications that the world provides, but there is no genuine ground for such regret where the classifications have been made in good faith by careful and logical thinkers. Some authors appear to think that there will some day be a single classification of diseases, and every day we see classifications put forward by eager workers which they seem fondly to wish shall replace all other classifications. glance into logical works on the topic of classification, even into the ancient work of John Stuart Mill, called a "System of Logic," would reveal to these workers the infinitude of classifications of the very same objects. A classification by causes may totally differ from a classification by genesis, and both may differ from a classification for the purposes of diagnosis, and in the end a classification by methods of treatment may be found to cut quite across all other classifications. Then, too, it is probably worth while to devote a sentence to the universal occurrence of the editorial imbecile (or shall we say idiot?) who makes fun of what he calls the classifying mania, apparently not being aware that almost the whole development of science and art depends on this so-called mania.

The etiologist may have in mind some particular factors which he would like to elevate into the so-called causes of disease. At the other end of the line some hospital administrator will be found who would like to classify all cases according to the amount of food, nursing and open plumbing which they may require. In between these two extremes may be found the practical diagnostician who has troubles of his own. The present effort deals with the troubles of the diagnostician rather than with the troubles of the etiologist or of the hospital administrator.

With more particular respect to the nervous diseases themselves is it not possible that the nervous diseases will very shortly fall into a common group with the mental diseases? Is there any point in producing an order of nervous diseases independently of an order of mental diseases? Probably the new art of neuropsychiatry is on its way, and neuropsychiatrists with equally good training on both sides will become available. However, we believe that it is the pragmatic situation at the present time that psychiatrists and clinical neurologists are two separate and different kinds of specialists. No doubt the fundamental basis of both arts lies in the science of neuropathology, taken in its widest sense of including both structural and functional concepts — but that wide and deep science is still (to borrow a leaf out of DaCosta's vocabulary) in an imperfect state. The question is a practical one. It is something like the question whether we ought to separate the specialties of dermatology and syphilis or the specialties of surgery and gynecology. Now one opinion, now another, will prevail, and there will be a progress toward a final decision.

Classification of Nervous Diseases. — As we approach the topic of the nervous diseases taken in their general sense, we find that the distinction between "organic" and "functional" nervous diseases is the most fundamental one in many systematic works and in, perhaps, the majority of nonspecialistic medical minds. Is a case organic or is it functional? — this is about as far as the general practitioner likes to wander in the field of clinical neurology. He has an idea that by means of the "reflexes" the neurologist more or less effectively arrives at a diagnosis of organic nervous disease and is often somewhat astonished that the neurologist cannot, by doubling or trebling the number of "reflexes" taken, somehow arrive at a diagnosis doubly or trebly accurate. In our view, this no doubt per-

fectly true distinction between organic and functional diseases is of little diagnostic value in the individual case, and this is aside from any doubts we may have as to the definition of the term "functional."

We examined the nervous diseases in sundry systematic works and seemed to be able to put these diseases into five groups as follows:—

Tentative sequence of major groups of nervous diseases due to (1) infection, (2) historrhexis, (3) neuronatrophy, (4 imbalance, and (5) special.

Application of Classification in Diagnosis by Exclusion. — Another word as to its application by the tyro or by the general practitioner. Let us suppose the general practitioner confronted by a paralysis. Suppose in the course of his thinking he lights on the hypothesis that it is due to "neuritis." He may then consider or look up in the books all the types of neuritis which he can find and look for signs or symptoms appropriate to one or the other of these groups. Now, of course, the diagnosis of neuritis may in itself be erroneous to start with, and the inquiry as initiated may become useless. According to our ideas, it would be much more to the advantage of the patient if the diagnostician proceed somewhat as follows: Here we have a case of paralysis of a limb! In the first place, is this paralysis at all related to infection? Are there any signs of (1) infection whether in temperature, in blood, or otherwise, in this patient? What tests should be employed to secure evidence on the point? In the second place, if the case shows no sign of infection, let us turn to the question of injury or other lesion of whatever sort which may have affected the tissues from without. if we cannot absolutely exclude infection as a matter of fact, let us for the purposes of diagnosis exclude it as a matter of argument until the rest of our tests have become available. Excluding infection, is there any evidence in the situation of a condition to which we above gave the name (2) historrhexis? Historrhexis might include the severing of a nerve or the nerve tissues by a knife or a bullet. It would include the blocking of nerves and the by-effects of historrhexis. For diagnostic purposes it would include the effects of an apoplexy not only as directly due to the destruction of brain tissue, but also to the pressure on collateral tissues. Not only trauma and arteriosclerosis, but also tumors, would be included in this concept of historrhexis, from which for our purposes the orderly exclusion

would have already excluded infection. The historrhexis inquiry sums up to an inquiry for trauma or other tissue-injuring lesions of noninfectious nature and of a focal character.

Thirdly, the diagnostician, having got rid of the hypothesis of (1) infection (including, of course, neurosyphilis) and of trauma and other forms of (2) historrhexis, would arrive, according to our scheme, to the group which we have termed (3) the neuronatrophies. Our first thought was to name these the "scleroses," since the group contains the various classic scleroses, like lateral sclerosis, multiple sclerosis, etc. But, on the whole, the primary fact appears to be that of neuronatrophy, a condition not of the general nature of historrhexis, but of a much finer and more differentiated type. With the infections and the common historrhexes out of the diagnostic way, the tyro would now come to the neuronatrophies, that is, to questions of combined system disease, syringomyelia, multiple sclerosis, etc. (The fact that, e.g., syringomyelia often results in historrhexis with secondary degeneration should not bother the diagnostician a whit. He has already considered the historrhexes and eliminated, perhaps, a transverse myelitis from the field of diagnosis. He does not arrive primarily at the question of syringomyelia, but only after having eliminated the effects of historrhexis [pressure myelitis] and infections [Pott's disease] which should be discriminated from syringomyelia.) (Again, some one might prove that multiple sclerosis is infectious. But the infectious group of nervous diseases, excluding some peripheral forms, is essentially a group of diseases in which pleocytosis of the spinal fluid is characteristic diagnostically. Multiple sclerosis appears to be in general outside this group. For the present pragmatic purposes multiple sclerosis should evidently fall among the classic neuronatrophies rather than among the historrhexes or infections of the nervous system.)

Fourthly, if the diagnostician has been able to eliminate (1) infections, (2) rhexes of tissues, and (3) differential atrophies of neuron system, he will arrive at a somewhat nondescript group which we above termed (4) imbalance, under which the drugneuritis cases, sundry metabolic disorders, the endocrinopathies and sympathetic system disorders fall. A great many of these conditions are conditions of what we might term tissue-imbalance. Imbalance is particularly well shown in the endocrine and in the various sympathetic disorders, and may also be shown in the metabolic group in some sense. Whether multiple neu-

ritis should not sometimes be grouped among the infections and sometimes among metabolic conditions is a question which we do not care to take up. Our purpose is not to add to theories concerning causation or genesis, but merely to take the diseases as they stand in the systematic works and throw them into an effective diagnostic order for the purposes of orderly exclusion.

Fifthly, over and above the (1) infections, (2) historrhexes, (3) neuronatrophies and (4) imbalance groups we have (5) a special or miscellaneous group in the field of nervous diseases, including such conditions as the various aglias, migraines, tics, spasms and vertigo, to say nothing of myopathies, osteopathies, various tissue atrophies, unexplained hydrocephalus, etc. With respect to this last group, the modesty of the clinical neurologists must forbid their complaining about how little they know. The aim of the present classification of nervous diseases is not to display the ego of clinical neurologists, but to find a method for arriving at diagnoses in a more logical manner.

Comments on this System. — We conceive that a system like that of classification into these five groups will serve to clarify many problems in the tyro's mind. The expert may not need it. We suspect that the expert is already using some such method, perhaps one private to himself which he has never thought of betraying to ordinary man. In conversation with various diagnosticians we find that they habitually use such systematic works as Oppenheim in a manner peculiar to themselves. Diseases in a book like Oppenheim's are worked over precisely as if they were in no important order whatever. do not deny that Oppenheim's excellent work arranges the diseases in an order on a certain basis. We deny that the order adopted has much to do with practical diagnosis. diagnosis in clinical neurology appears to have been chiefly a topical diagnosis devised to find, in the brain or spinal cord, the seat of lesions chiefly of the group we have above termed his-To adopt a more general medical attitude such as that defined in these five groups is a plan not found in textbooks of clinical neurology. We suspect, however, that the more mature the clinical neurologists become, the more they arrive at some such practical method for diagnosis by exclusion in order.

We have no idea of insisting that the order we here present is a final order, that it is an order which forbids interpolation or extrapolation, or that it is an order that cannot be changed to advantage. We would like to have the topic considered carefully by those who are concerned, and we are of the opinion that some uniformity of the scheme of elimination for practical diagnostic purposes for the various nervous diseases will greatly benefit the treatment of patients. If, by the naked eye, one has somehow guessed that a patient has a nervous disease, perhaps by means of the low power of the logical microscope, he will come to one of the five groups above mentioned as the logical site of the disease in question. Suppose now that he turns on the somewhat higher powers of the logical microscope. The five groups are subdivided somewhat as follows: —

SUBDIVISION OF FIVE GROUPS OF NERVOUS DISEASES.

1. Infections: -

Treponema.

Parasites.

Bacteria. Unknown infections.

2. Historrhexes, focal destruction (non-infectious): —

Heightened intracranial pressure.

Vascular.

3. Neuronatrophies, scleroses ("classical degenerations"): —

Systemic scleroses.

Hereditary scleroses.

Diffuse scleroses.

4. Imbalance exo (neuro) genous: -

Drug. Metabolic. Endocrine.

Sympathetic.

5. Miscellaneous: —

Algias, migraine, vertigo. Tics, spasms.

Tissue atrophies. Hydrocephalus.

Myopathy.

Et al.

Osteoarthropathy.

SYNOPSIS.

1. Infection.

[Diagnosis by signs of infection, pleocytosis of liquor, etc.]

Treponema.

Tabes.

Pachymeningitis cervicales

hypertrophica.

General paresis.

Bacteria.

Epidemic meningitis.

Tuberculous meningitis.

Streptococcus meningitis.

Neuritis.

Tetanus.

Myelitis. Encephalomyelitis.

Abscess.

Unknown.

Poliomyelitis. Hydrophobia.

Landry's disease.

Herpes zoster. Chorea minor.

2. Historrhexis (Focal Destruction).

[Diagnosis by reflex-signs, heightened intracranial pressure, etc.]

Trauma.

Vascular.

Tumor.
Recklinghausen's disease.

Caisson.

Little's disease.
Hematomyelia.
Anæmia.
Hyperemia.
Hemorrhage.
Softening.
Hemorrhagic encephalitis.
Polioencephalitis, acute
hemorrhagic, superior.

Sinus thrombosis.

Aneurysm.

Pseudobulbar palsy?

3. Neuronatrophy.

[Diagnosis by characteristic picture and history.]

Systemic Sclerosis.

Lateral sclerosis.
Combined system.
Amyotrophic lateral
sclerosis.

Primary muscular atrophy.
Senile paraplegia.

Diffuse Sclerosis.

Multiple sclerosis. Pseudosclerosis? Gliosis spinalis.

Syringomyelia.
Paralysis agitans.

Hereditary Sclerosis.

Friedreich's ataxia.

Amaurotic idiocy.

Familial infantile paral-

ysis.

Primary muscular atrophy, familial form (bulbar form).

Huntington's chorea.

4. Imbalance.

[Diagnosis by characteristic picture.]

Spasmophilia.

Drug.* Neuritis. Metabolic Disorder.

Neuritis.

Multiple Neuritis. Diabetic, senile, Tetany.

etc.

Endocrinopathy.

Acroparesthesia.
Angioneurotic

Sympathetic.

edema.

Myxedema inter-

mittent.

Exophthalmic goiter.

Cretinism.
Infantilism.
Acromegaly.

Hydrops articulorum.
Raynaud's disease.

Erythromelalgia. Scleroderma.

5. Miscellaneous.

Algias.

Migraine.

Vertigo.

Tics, Spasms.

Occupation-neuroses. Tic, convulsive.

^{*} It is possible that these cases should be placed under historrhexis, although many of the phenomena are reversible.

5. Miscellaneous — Concluded.

Myopathy.
Primary myopathy.
Dystrophy, muscular progressive.
Thomson's disease

Thomsen's disease. Myasthenia gravis. Paramyoclonus. Osteoarthropathy.
Vertebral disease.
Luxation — fracture.

Tissue Atrophies. Hemiatrophy facialis. Hemihypertrophy facialis.

Caries.
Tremors.
Syphilitic.
Arthritis deformans.
Osteomalaceous paralysis.

Hydrocephalus. Meningitis serosa. Undefined.
Caisson.
Anomalies.
Reflex paralysis.
Exhaustion paralysis.
Periodic paralysis.

SUMMARY.

The method of diagnosis by orderly exclusion, already proposed for use in the diagnosis of mental diseases, is probably of equal value in the field of nervous diseases. The writers have endeavored to gather the main types of nervous disease into a comparatively small number of groups for successive consideration by the tyro, or even by the expert, in diagnostic elimination. Experts may prefer a different order from the one proposed; but it is unlikely that any neurologist fails to use, consciously or unconsciously, some form of orderly diagnosis.

Yet the student is quite likely to be taught that the best procedure is to pick out some striking symptom in a case under consideration, and to follow that symptom back to textbook models for a suggestion as to the entity involved. He then endeavors to match the data of the case in hand with the possibilities laid down in the textbook.

We think that it is much more desirable to take the general situation in the body at large into account, and to include, if possible, first, the hypothesis of an infectious origin for the symptoms. Secondly, we try to exclude, if possible, the effects of coarse and otherwise destructive lesions of the nervous system (historrhexes), namely, in general such conditions as show no signs of infection, but exhibit reflex disorders and signs of heightened intracranial pressure and the like, suggestive of focal lesion. Thirdly, we come to the hypothesis of the existence of one or other of those classic degenerations with which the neurologist is familiar. If infection, historrhexis, and classic de-

generations can be excluded, we then proceed, fourthly, to the hypothesis of some kind of imbalance, perhaps metabolic or endocrine or sympathetic. If the diagnosis cannot be made on these lines, possibly the condition belongs in some miscellaneous and otherwise undefined or highly specialized group.

Even when the disease seems to be limited to a peripheral nerve, we consider that then the successive hypotheses of (1) infection, (2) historrhexis, (3) specialized neuronatrophy, (4) imbalance, can be preferably considered in that order. We think that by the pursuit of some such method as this the neurologist can bring his work better into line with that of general medicine. The method is, moreover, a very pragmatic method, since lines of treatment are specially indicated for the different great groups of disorders. But in so difficult a field we do not wish to dogmatize, and shall be content if our communication arouses interest in the application of the key or order principle to the diagnosis of nervous diseases.

AN ATTEMPT AT AN ORDERLY GROUPING OF THE FEEBLE-MINDEDNESSES (HYPOPHRENIAS) FOR CLINICAL DIAGNOSIS.

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Feeble-mindedness is no doubt a leading social problem, educational, moral, legal, economic in its ramifications - nothing thank Heaven, just now more in the legislative eye of the more civilized of our States. So bright are many of its prospects (compared, for example, with closely adjacent problems of insanity, nervous breakdown, crime, prostitution, drug-addiction, business dishonesty, Bolshevism) that the social worker and the psychologist almost hear the victory drumbeat. There was, indeed, some time since, a sizable volume of sound from the eugenic side, with not a few tum-tums heard in legislative halls, but the wiser heads knew that the "hereditary" in the eugenic sense could not for long contain the "congenital" in the pathological sense. Preventive medicine was seen to have its duties as well as eugenics. Again, we heard the very proper pæans in praise of Binet, or at least of the Binet group of psychometric methods. Psychology has beyond question won its spurs and is duly on parade. Pricked by the physician on the one hand and by the psychologist on the other, now, too, the social worker has begun to adjust himself to the new notions. Even the economist in academic shades has heard enough to inquire what it is all about and looks rather sadly at the Economic Man, left a broken image on his hands.

But throughout these recent discussions, whether pedagogic, eugenic, psychometric, social-adaptive, or legislative, feeble-mindedness is, perhaps, too often taken collectively. "The ungraded" get collectively regarded as a generic problem of schools. The eugenist is apt to think his propaganda imperilled by granting that "best regulations" may still allow feeble-minded to slip into good old family stock. The psychometrist is apt to group his mental test results about a "norm" and to think of the "normal" as fading down imperceptibly into feeble-mindedness. Not less parlously collective is that social worker's attitude which proposes to do for the feeble-minded

some one thing, usually internment, possibly sterilization! And the legislator, no less eager, wants to know how many there are, so that State care may be arranged on a century-living plan. But, before we ask how many, how they test out, how to avoid begetting them, how much to teach them, and the like, would it not be well to find out who they are, what they are, — in short, call in Mr. Kipling's six honest serving-men?

The efforts of the Six Serving-men will prove (to the physician's best guess) at first rather more distributive than collective: hence the oddity of one item in this paper's title, "The Feeble-mindednesses." What feeble-mindedness is, turns into what they are. Why they are leads into myriad alleys of causation. "When" need not get the reply "always," if it be true that some feeble-mindednesses are preventable. How, where, and who are likewise distributive enough to satisfy the most practical inquirer into feeble-mindedness.

It is our duty, then, to counteract the over-collectivism of much modern inquiry and of most modern provisional answers. But this broad duty is far too broad for my present paper. I wish in this paper to re-emphasize the medical fundaments of the feeble-mindedness problem. The what, why, and how of the matter are also beyond my present scope, though the "Waverley Researches in the Pathology of the Feeble-minded" have engrossed much of my time in the latter years and though I feel that such researches, aided by further psychological and physiological work, are essential to progress.

Disregarding what research may in future do, I want to stimulate the taking account of stock, the stock of ideas of the present day. The nub of my contention is that, despite the value of the mental test levels and even to reinforce their values, we should sharpen our medical diagnostic technique.2 again, perhaps not so much our technique as our interest. so-called diagnosis "feeble-minded, mental level eight years," is, to speak roundly, not a diagnosis. "Feeble-minded, mental level eight years," or "Imbecile, mental level, eight years" is a fact and a grouping, but not diagnosis in any valuable sense of the term diagnosis. It gives no picture of the case; it yields no hint of causes or (worse still) of consequences; one gets no idea of course and outcome; one cannot guess at treatment or at an appropriate school training. In short, the "diagnosis" of so-called "feeble-mindedness," or of the most finely discriminated mental level or intelligence quotient, is of the same value as a "diagnosis" of "epilepsy."

Feeble-mindedness is just as fundamentally a matter of sharply defined feeble-mindednesses as epilepsy is of epilepsies, as insanity is of mental diseases. Now every one, not himself defective, admits that we may profitably at times look on the feeble-minded distributively, even individually. My point is that, so long as physicians content themselves with this large category "feeble-mindedness," just so long will they contribute nothing which any good psychologist, teacher, social worker or nurse could not as easily contribute. This great category is not practical. It does not help the patient, it leads to premature generalizations, and it lulls everybody to a rather dogmatic slumber.

Our first result, then, is that feeble-mindedness, collectively taken in the singular number, gives a wrong impression of unity. Distributively taken in the plural, the feeble-mindednesses yield us a better approach.

How shall the feeble-mindednesses be grouped? Modern science would hasten to answer, etiologically. And when etiology fails us, let us group by the outstanding clinical similarities. But in any event let us make a practical classification, leading if possible to definite proposals for handling, *i.e.* for treatment and training in the broadest senses of those terms. Taking what etiology and clinical observations have to offer, let us demarcate such entities as may exist and work upon these as our fixed point of maneuver.

But, will say the non-psychiatric physician, what is here being advocated but the ordinary procedure of medical science? Nothing else indeed! Yet do we not see in many communities and even in some institutions for the feeble-minded a nonmedical view prevailing? Is not the medical view held secondary to the pedagogic view? Have there not been some to advocate the control of the feeble-minded by non-medical officers? I do not intend to enter that controversy, and I know that much can be said on both sides. But it is my firm conviction that there is no hope of profound progress in the treatment of feeble-mindedness without the medical approach. I hold that the feeble-mindednesses belong in psychiatry, taken as the comprehensive art and science of mental diseases and defects. Progress as to the nature, causes, and treatment of feeble-mindedness should go pari passu with progress in medicine as a whole. Neither estimates of social disturbance caused by feeble-mindedness nor measurements of intelligence-defect in

the feeble-minded, nor the most ingenious advances in the pedagogy of the feeble-minded, will get us appreciably forward in the work of prevention, cure, or alleviation of the disease feeble-mindednesses, or, to speak more strictly, the diseasegroup of the feeble-mindednesses. There are many reasons (including the intrinsic difficulty of the topic) why progress in the study of feeble-mindedness has not lockstepped with progress in the rest of medicine. Feeble-mindedness even dwindles a long way behind the rest of psychiatry — a sad confession! one reason for our poor record was the year-long belief that feeble-mindedness is nothing but a pedagogic problem. same sense, puberty is nothing but a pedagogical problem. tremendous access to our technique and grasp, afforded by the Binet tests, again served to efface the medical base-lines of the problem of feeble-mindedness. What we were teaching and who it was we were measuring, these questions were subordinated to methods of teaching and the collection of vast stores of mental test records.

Truly this pedagogy and this psychometry were better than nothing. A good pragmatist might hope something from all this.³ The medical base-lines might prove exceedingly simple and self-explanatory, and the analyst might be able to reason backward pretty conclusively from the pedagogical and psychometric results. But that happy issue would be windfall good fortune. The fungi that happened to come to notice might be all edible mushrooms and no toadstools admixed, and eels do look a good deal like snakes.

In short, can there be any question that, however indispensable to progress pedagogy and psychometry have been, there has been grievous neglect of the nosological side of the problem of the feeble-mindednesses?

My present attempt at orderly grouping of the feeble-mindednesses is but an attempt. As an everyday psychiatrist, one cannot approach the feeble-mindednesses ordinarily with the same amount of what used to be called "unconscious cerebration" as other large psychiatric subgroups. And I do not think I would have dabbled in the problem but for two facts: First, I have had a sharply limited, but interesting, cross-light on this problem from the "Waverley Researches in the Pathology of the Feeble-minded" now in progress. Secondly, I have been engaged in developing a logical plan of diagnosis by orderly exclusion, 2, 4, 5, 6, suited to the general purposes of psychiatry and therefore probably of some service in the subdivision of psychiatry that deals with the feeble-mindednesses.

These other studies are elsewhere accessible. The Waverley studies call attention to the large proportion of (theoretically) preventable feeble-mindedness, conditions which at all events are not to be set down as "hereditary" in the common meaning of that term.

Diagnosis by exclusion is a time-honored method, though upon occasion slandered by those who (erroneously, as I hold) identify diagnosis with observation and seem to think they have made a "diagnosis" when they "observe" a smallpox eruption or a finger torn off. It is less easy to recognize a smallpox eruption than an amputated finger, purely because more experience is needed for the recognition of the former. But a physician's diagnostic technique is not necessary for either. A great deal of so-called "direct" diagnosis appears to be of the simplest, when logically viewed. It is as if your chess opponent called out "check" or "guard your queen!" whereupon you would make a direct diagnosis that your king or your queen was in danger! But assuredly those are not the true diagnostic difficulties in chess. There are, of course, in the field of the feeble-mindednesses a number of simple recognitions of a direct nature that involve next to no diagnostic acumen, e.g., some of the queer skull shape cases. there are others wherein a few days' or weeks' institutional experience abolishes the problem of diagnosis and leaves it one of immediate observation or (as you might say) mere gnosis 2, e.g., some cretins and mongolians. For these last, diagnosis per exclusionem may be superfluous.

The novelty of the method of orderly exclusion (diagnosis per exclusionem in ordine) consists in the application of the time-honored method of exclusion in a fixed and arbitrary sequence, and in a sequence that seeks to include all possible headings. DaCosta used to decry the general method of exclusion as a tedious one and also because our knowledge of pathology was imperfect.* The latter objection cut under his own beloved "direct method" and all other methods equally, and pathology remains imperfect to this day. But the objection of tediousness we can in a measure meet by skillful subgroupings.

It is to be understood that I have no desire to abolish the old and in many ways valuable subdivisions, — idiocy, imbecility and feeble-mindedness proper, — together with the higher group of

^{*} Reviewed in Reference 2.

subnormals that some distinguish. Those levels and the still more finely distinguished age levels and intelligence quotients of the psychometrists remain as valuable cross-distinctions. But what I contend for is persistent medical study of the entity base-lines, study along the lines of Bourneville or of the wellknown textbook of W. W. Ireland.* Again, just as one recognizes the supreme values of the mental test work of the psychometrists, so one recognizes the equally fundamental research work of Hammarberg * and of Tredgold * (in the small material at their disposal) to prove the correlation of nerve-cell deficiency with mental deficiency. But, in addition to and to form a basis of that psychometric and encephalometric work, it would seem to me that hard, careful work in the further elucidation and amplification of disease entities is the work of the immediate future. We are much more likely to find successors to Hammarberg, willing to cut, stain, measure, and count in the laboratory, than we are to find successors to Bourneville, who saw feeble-mindedness whole and pulled out sundry entities, e.g., of a glandular nature.

Let us plunge into the middle of our topic and take up one of the more recent classifications of the feeble-mindednesses as given by Weygandt ⁷ in the Aschaffenburg "Handbuch."

As no doubt this "Handbuch" will be a source of authority for some decades, Weygandt's principles of classification are worth considering. Weygandt states that his classification proceeds in two directions, namely, the practical direction of the educability and social handling of the feeble-minded and from the more scientific standpoint of the natural variety of the Weygandt himself presents thirty groups of idiocies and imbecilities, but collects the thirty groups into fifteen somewhat larger groups. If we should take the genus-species distinction upon its face value in Weygandt's presentation, we should then be tempted to regard his estimate as amounting to the existence of at least thirty species and at least fifteen genera of feeblemindedness. A closer inspection of his tabulation, however, indicates that, while some of the old groups correspond with species or entities of feeble-mindedness, on the other hand several of the more subdivided groups indicate the breaking out of groupings to correspond not only with the simple distinction of genus and species but with the smaller subdivisions that are termed varieties and the larger collections that are termed orders.

^{*} Reviewed in Reference 1.

Practically speaking, it seems impossible to carry in mind for everyday work thirty major groups. Theoretically speaking, we should hardly be content with so small a number as thirty-odd groups. At all events for the tyro in diagnosis a rearrangement of these entities or entity groups would be highly desirable if it could be carried out on any basis at all satisfactory.

Let us consider for example the tyro's attitude to Weygandt's last and thirtieth group, the group he terms "sonstiges." Hereunder, Weygandt includes such matters as feeble-mindedness due to tuberculosis, tumors, etc., sclerosis multiplex infantilis: infantile spinal paralysis; family hereditary spinal paralysis; amyotrophic lateral sclerosis; the Westphal-Strumpell Pseudosclerosis, and Wilson's disease; Mobius' infantile Kernschwund: hemiatrophia faciei; and traumatic idiocy. Here is indeed a miscellany, a rag-bag of extras and sundries, some of which would carry their diagnosis so to speak on their sleeves. Others might very probably require an autopsy or even a histological examination for their placement. Aside from the question of whether these feeble-mindednesses are not a purely secondary and adventitious affair, many of these conditions in Weygandt's sonstiges are plainly species or varieties of feeblemindedness in some sense of that term, but it is manifest that they should be combined into higher groups if they are to be successfully borne in mind by the average diagnostician or by the diagnostician with an average memory (far be it from the intention here to insist that ability to diagnosticate varies directly with the memory). Let us then leave to one side sonstiges for the moment and consider the other twenty-nine groups. Of these, eight are groups without subdivisions and may very well correspond with botanical or zoölogical species, or possibly they represent genera with but a single species each. Following is a list of these comparatively simple (that is non-subdivided) groups (Weygandt's numbers are placed in parenthesis): -

- 1. Syphilidogenic (17).
- 2. Alcohologenic developmental disorder (18).
- 3. Athetotic (19).
- 4. Choreic (20).
- 5. Spasmophilic and epileptic (21).
- 6. Rhachitic (22).
- 7. Chondrodystrophic (23).
- 8. Tower skull (24).

To these eight comparatively simple or non-subdivided groups might be added a group,7 called edogenous, containing micrencephaly and other brain disorders of an embryonic origin (Wevgandt's group 3). In the analysis of Weygandt's grouping, then, we find besides the sonstiges or miscellaneous group containing a dozen subdivisions, more or less, eight or nine other comparatively simple groupings of more frequent occurrence major interest, namely, the groups just listed. Do these groups correspond more with species or more with genera? Doubtless none of them can be regarded as a mere variety of some species. It is clear that the endogenous group breaks out into a great number of special forms of embryonic disorder which might be regarded as species in a genus, and it is likewise clear that the syphilitic group contains such various examples of idiocy, imbecility, and still slighter degrees of feeble-mindedness. Here, again, either a genus is breaking out into species or a species into varieties. Our task it is to gather these conditions into such practical groups as may be borne in mind by the tyro in diagnosis or by the diagnostician who does not possess an encyclopedic memory. We are not concerned primarily with the decision whether any given condition should be granted the dignity of a species or a genus. Our aim is purely practical. We may admit forthwith, then, that the syphilitic, alcoholic, epileptic and rhachitic forms, possibly also the choreic forms, of feeble-mindedness are entitled to a certain separateness of consideration — and this on purely practical grounds. Chorea may have one of several origins. The spasmophilic or epileptic group may be even more entitled to claim all sorts of causes. Practically, however, it is surely important to consider all spasmophilic and epileptic cases from a special standpoint and to treat them from a special standpoint. As for the athetotic and tower-skull forms, possibly these might be regarded as displaying their diagnoses too plainly to require special mnemonic entries in the diagnostician's mind. With respect to the athetotic and chondrodystrophic forms, however, we must not think of them as worthy of particular study, to place them if possible in some more practical group having an exact etiology or a special therapy.

The critic at this point is therefore inclined to admit that syphilitic, alcoholic, epileptic, rhachitic, and possibly choreic, forms of feeble-mindedness are entitled to separate consideration on practical grounds. He is inclined to place the tower skull in the miscellaneous group and to inquire a bit further

concerning the athetotic and chondrodystrophic forms. The pragmatic resting place does not seem to the practical diagnostician to be quite reached when a case of feeble-mindedness is termed athetotic or chondrodystrophic.

Let us now look back at a few of the older classifications, those of Henker, Spielmann, Morel, Dubois, d'Amiens, Belhomme and Kerlin, all built upon the distinction of levels in mental capacity, offer little or nothing of value to the description of entities.

The interesting old classification of Esquirol is no doubt of psychological value. According to Esquirol's classification, there is a type of feeble-mindedness in which speech is absent altogether, a second type in which only monosyllables and certain cries are used, and, thirdly, a type in which isolated words and short phrases are used. No doubt Esquirol was right in regarding speech as the most quantitative test by which to group the feeble-minded, at least the most quantitative test available to him in his day.

The classification offered by Voisin attempts to add some prognostic features to the differentiation of four types of feeblemindedness, namely, (1) complete idiocy, (2) incomplete idiocy, (3) imbecility and (4) mental debility. Thus Voisin attempts to subdivide the major forms of feeble-mindedness according to their degrees somewhat after the manner of more modern work on levels. For instance, Voisin's complete idiocy, regarded by him as absolute and incurable, was of two degrees, — a degree which he termed anencephalic, namely, such as did not have even the instinct of self-preservation, and a somewhat higher group who not only possess the instinct of self-preservation but are also able to acquire certain habits. There was a certain tendency in these older classifications to compress the various clinical entities into the confines of particular levels. Thus Voisin regarded the cretins as belonging in his group of incomplete idiocy, a type of idiocy susceptible of some amelioration. Voisin's imbecility again was a descriptive group characterized by the presence in rudimentary form of practically all the mental and moral faculties of normal persons. Mental debility was characterized merely by feebleness or imbalance of these faculties.

From the etiological side various more or less simple classifications have been proposed. For instance, Langdon Down divided cases into congenital, developmental and accidental, subdividing into some twenty smaller groups his ethnological

grouping (in which he proposed various types of feeble-mindedness to be termed Caucasian, Ethiopian, Mongolian, Malayan and Negroid) which seems to possess very little even of historical value.

It is evident that the division of feeble-mindedness into idiocy, imbecility, moronity, and still lesser degrees of subnormality is in the main a psychological classification and represents a roughly psychometric estimate of mental capacity. Accordingly, the efforts of Binet and his successors to refine these psychometric estimates are in direct continuity with the total development of one side of our topic.

Quite in the other direction run such divisions as those of Bourneville, Ireland, Shuttleworth and others. Take for one example Bourneville's division of the feeble-mindednesses under the following ten heads:—

- 1. Meningitic idiocy.
- 2. Meningoencephalitic forms.
- 3. Developmental or simple arrest forms.
- 4. Atrophic sclerosis.
- 5. Hypertrophic or tuberous sclerosis.
- 6. Porencephaly.
- 7. Pseudoporencephaly.
- 8. Myxedema.
- 9. Congenital malformation.
- 10. Microcephaly.

Or take Wilmarth's report of 1890 based upon the examination of one hundred brains:—

- 1. Imperfect development of brain.
- 2. Various forms of non-development.
- 3. Various forms of degenerative change of nerve or vascular tissue.
- 4. Sclerosis or atrophy.
- 5. Diffuse sclerotic change.
- 6. Tuberous sclerosis.
- 7: Skull hypertrophy.
- 8. Hydrocephalus.
- 9. Old meningitis.
- 10. General cerebral atrophy.
- 11. Demi-microcephalus.
- 12. Over-weight brains with large and simple convolutions.
- 13. Infantile hemorrhage.
- 14. Angioma of vessels of brain.
- 15. Glioma with sclerosis.
- 16. Porencephaly.

Such classifications as these of Bourneville and of Wilmarth obviously give a better insight into the actual conditions found in the great group of the feeble-mindednesses. They give a most proper view of the tremendous variety therein found. These findings should give pause to all workers who desire to over-simplify the subject by vast overextension of the concept of heredity. It is very clear that many of the conditions listed, whereas they may be of congenital origin, are assuredly not of hereditary origin. The heredity question thus reduces to a statistical one. Few communities have enough of their feeble-minded under governmental care to permit proper statistics to be erected covering the distribution of all these forms. It is true that the idiots and low imbeciles are in many communities more likely to go forthwith under State care than are the lesser degrees of feeble-mindedness psychologically taken. Enough has been said to indicate that neither the mental level grouping, whether in its simple or in its complex forms, nor the etiological groupings are of particular value in the immediate task of diagnosis. To be sure, as above stated, many cases hardly require more than a glance for their preliminary placing in certain groups.

But where the classification of a case depends not upon the first glance or the initial interview but upon more complicated processes of diagnosis, it would seem wise for the tyro at least to use some form of diagnosis by orderly exclusion. I have in a series of papers discussed this method of diagnosis by orderly exclusion as applied to psychiatric diagnosis and to the diagnosis of various subgroups in the psychiatric field. In the earliest paper on this topic I attempted to subdivide the feeble-mindednesses according to the classical divisions of idiocy, imbecility, moronity, and subnormality of lesser degree. But I am convinced that a more entitative and less psychological grouping is required for the majority of purposes. Without justifying it in all respects, I therefore offer the following description of the rough outlines of the diagnostic process relative to the main captions which the examiner must consider.

In the first place it is certainly necessary to exclude syphilis as a factor in feeble-mindedness. This point is not made to indicate that there is any statistically large number of syphilitic feeble-minded, though adequate statistics are not yet available for the tens of thousands of cases which should be duly observed in this regard. But syphilitic feeble-mindedness

belongs more properly, I believe, to the neurosyphilitic group of nervous and mental disorders and hence I have not put syphilitic feeble-mindedness in the tabulated groupings below. In the process of psychiatric diagnosis, syphilis will either have been excluded by suitable tests or else will be knowingly omitted from consideration.

What now shall the diagnostician consider? We must not only take into account those types of feeble-mindedness which can be psychologically defined and those cases which autopsy may show to be etiologically of such and such a nature, but we must take into account our means of diagnosis and the comparative reliability of the methods. Roughly speaking, exclusive of the small group of the syphilitic feeble-minded, it would seem possible to divide the feeble-minded into what might for convenience be termed brain cases, gland cases, hereditary cases, and special or atypical cases.

It will be observed that when we specify brain cases we do not launch forthwith into a question whether the brain defects are of congenital, acquired or accidental origin. When we speak of gland cases, we make no attempt at prognosis. speak of hereditary cases we speak, or ought to speak, of cases in which the history provides convincing evidence of heredity, preferably of identical heredity. Roughly speaking, it will seem that our methods for diagnosticating the brain injury cases are somewhat superior in reliability and range to the methods we possess for establishing the endocrine nature of a case. brain data and the endocrine data are doubtless superior in reliability to what we can ordinarily find by hereditary investigation. As for the special and atypical forms, it is no doubt better to leave them in an undifferentiated group, without specification as to their etiology or outcome, than to thrust them more or less violently into other more definite groups. In particular it will be observed that our diagnostic process of exclusion in order does not immediately take into account the question of psychological level. For it must be freely admitted that brain cases fall into one of several psychological levels.

If my estimate of the reliability and availability of present day diagnostic tests be a correct estimate, then the diagnostician would consider, after excluding syphilis, first, cases in which neurological technique (reflex testing, observations of muscular and sensory power, etc.) would define as brain injury cases (encephalopathic). Upon exclusion of the brain factor or upon reso-

lution of the brain factor as simply incidental in the general somatic picture, the diagnostician would proceed to the second great group of the feeble-mindednesses, namely, the somatic or more particularly the endocrine group. He would then come down upon cases of heredity. Finally, he would be reduced to placing his case in a residuum of indefinite or not understood cases.

But under each of these major headings would fall a number of minor headings that will prove to be the actual genera or species of feeble-mindedness. These are given below in a tabulated statement concerning the group. The data of the psychological examiner should then be added to the medical data and specification made as to whether a given microcephalic, or cretin, is, for example, an idiot or an imbecile. In the following table I have placed the main headings of the feeble-minded group, and I have put in parallel columns opposite these headings some items which I termed the "usual mental test distribution." This "usual mental test distribution" is to be taken as an exceedingly rough estimate of the possible statistical distribution of the entities in feeble-mindedness as they will be found to fall within the commonly recognized psychological levels. To illustrate the meaning of the table, I have checked under "encephalitic forms" idiocy and imbecility, with the idea of suggesting that the encephalitic forms of feeble-mindedness usually found occur psychologically as idiots or imbeciles rather than as morons. Whether this statistical estimation is true is another question, and the conception of the true meaning of encephalitis both in feeble-mindedness and in epilepsy is broadening very fast. Again, I place the hydrocephalic cases with a double asterisk under idiocy and a single asterisk under imbecility thereby suggesting that the morons are not at all frequently hydrocephalic. But I would beg that these suggestions as to the occurrence of idiocy, imbecility, moronity and border-line levels among the various medical entities be regarded as purely suggestions and as simply illustrating the necessities of combined diagnosis in the field of feeble-mindedness.

THE FEEBLE-MINDED GROUP (HYPOPHRENOSES).

[Usual "mental test" distribution.]											
Encephalopathic: —	Idiocy.	Imbecility.	Moronity.	Border Line.							
Microcephaly.	**	*									
Hydrocephalus.	**	*									
Focal brain disease: —											
Traumatic (birth).	*	*	*								
Hemorrhagic.	*	*	*								
Encephalitic.	*	*									
Meningitic.	*	*	*	*							
Somatopathic (glandular): —											
Cretinism.	**	*									
Infantilism.	*	*	*								
Dysadenoidism.	*	*	*	*							
Mongolism (glandular?).	*	*									
Heredopathic (hereditary): —											
Feeble-mindedness.			*	*							
Amaurotic family idiocy.	*										

Special and Atypical Forms.

SUMMARY.

The object of the present paper has been to group the types of feeble-mindedness in an orderly manner for the practical purposes of clinical diagnosis. There has been no intention of proposing new entities or new causes for any kind of feeble-mindedness. My object has been so to group the feeble-mindednesses that the tyro in the topic, e.g., the general practitioner of medicine, shall be able to hold in his mind certain very large captions under which the feeble-mindednesses occur. In the text I have reviewed a number of lists of the feeble-mindednesses, in particular the list proposed by Weygandt in one of the prominent systematic textbooks of psychiatry. Weygandt proposes thirty groups, and it is quite clear that no one but a specialist in the topic can bear all these thirty groups in mind for the purposes of diagnosis by exclusion.

My scheme, as may be seen from the table placed just before this summary, is perhaps over simple. Roughly speaking and in the vernacular, we may, I believe, think of feeble-mindednesses as either (a) "brain" cases, or (b) "gland" cases, or (c) "germ cell" cases, or (d) other special forms.

It must be clear to the specialist that when we speak of "brain" cases (above termed encephalopathic) we do not necessarily exclude the glandular origin of some of them. For example, microcephaly is a condition of little-endedness of the body in which not only brain but skull and head share in the diminution. Is not microcephaly possibly due to disorder of some gland which superintends the growth and size of the head? This is entirely possible, but for practical purposes microcephaly may, perhaps, for the present best be considered a "brain" condition rather than a more general "gland" condition.

It must be equally clear that "gland" (somatopathic) cases may well be associated with brain disorder, e.g. cretinism. The emphasis here must be placed upon the greater importance of the "gland" rather than the "brain" factors in the case for practical purposes.

Again, "germ cell" (heredopathic) cases may certainly produce "brain" disorder. If amaurotic family idiocy is best regarded as a familial or hereditary or in some sense "germ cell" disease (and the condition has been provisionally here so placed), then it must be admitted that amaurotic family idiocy shows brain disease, and brain disease of a very exquisite nature. Still for practical purposes should we not emphasize the familial nature of amaurotic idiocy and classify it as a "germ cell" (heredopathic) condition?

My suggestion for the inexpert dealing with feeble-mindedness is that all the types of feeble-mindedness be sub-sumed under these three or four heads, encephalopathic, somatopathic, heredopathic, and special. I hold that it would inure to the practical benefit of the patient if each practitioner confronting a case of feeble-mindedness should consider it from the brain, gland and germ cell points of view respectively. How final these distinctions are, no man can say; but I am entirely sure (and I think most specialists in this field will agree with me) that the heredity hypothesis has been greatly overdrawn in the field of feeblemindedness, and that it is high time for some emphasis to be laid upon the existence of brain cases in which the "germ cell" element is, to say the least, remote or unproved. That there is also a somatopathic group, chiefly glandular, in which the brain disease is secondary or incidental, there can hardly be any doubt. Whether Mongolism should be classed as an endocrine disease is a subject of question, but the disease has been placed provisionally in the somatopathic group.

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A STATE PROGRAM FOR THE CARE OF THE MEN-TALLY DEFECTIVE.*

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It is now generally understood that the feeble-minded and the progeny of the feeble-minded constitute one of the great social and economic burdens of our modern civilization. We have much accurate knowledge as to the prevalence, causation, social significance, prevention and treatment of feeble-mindedness, its influence as a source of unhappiness to the defective himself and to his family, and its bearing as a causative factor in the production of crime, prostitution, pauperism and other complex social diseases. The literature on the subject has developed to enormous proportions. An intelligent democracy cannot consistently ignore a condition involving such a vast number of persons and families and communities, so large an aggregate of suffering and misery, and so great economic cost and waste.

Nearly every State in the Union has already made a beginning in the way of a program for dealing with the mentally defective, either directly or indirectly. The development of this program in the different States varies greatly in degree and method. Even the most advanced States have not yet formulated a plan for reaching all of the feeble-minded of the State. It is safe to say that no State has yet officially taken cognizance of 10 per cent of the mentally defective persons in that State. No State has even ascertained the number of feeble-minded in the State, their location or the nature and expression of their defect. The great majority of these defectives receive no education or training and no adequate protection and supervision. We know that feeble-mindedness is highly hereditary, but in most States there is no legal obstacle to the marriage of the moron, the most numerous class of the feeble-minded.

There are many reasons for the lack of a formal accepted program. The problem cannot be solved by a simple formula, which can be expressed in one definite piece of legislation. It is an infinitely complex problem, varied according to age, sex, degree and kind of defect, presence or absence of hereditary traits

^{*} Read at the Child's Welfare Conference called by the Children's Bureau of the Department of Labor, and held at Washington, D. C., in May, 1919.

or criminal and antisocial proclivities, home conditions, etc. The idiot, imbecile and moron present different needs and dangers. Each of these groups has different troubles, according to age and sex. Rural, sparsely settled communities, with homogeneous racial populations, have conditions pertaining to the defective which differ from those of urban industrial centers, with cosmopolitan racial complications.

The first step in a rational program would be the beginning of a complete and continuing census of the uncared-for feeble-minded of the whole State — this would state and define the problem. Many privately conducted surveys show the feasibility of such a census. The data for this census would be furnished by physicians, clinics, court and jail officials, social workers, town officials, teachers, etc. No doubtful case should be registered. Only those persons whose mental defect has been scientifically diagnosed should be registered. The register should be highly confidential and accessible only to properly accredited persons.

This co-ordination of existing records would be available for social workers, school authorities and other agencies, and would be of enormous service in the solution of the individual problems which the feeble-minded constantly present. This alone would mean a great saving in time, effort and money. This official census would give a logical basis for intelligent management of the mental defectives of the State.

A census of the feeble-minded would make possible and desirable some provision for a central governmental authority responsible for the general supervision and assistance and control of the uncared-for feeble-minded of the State who do not need immediate institutional commitment. This State supervision of the feeble-minded should be directed by a State commission for the feeble-minded, or a properly constituted State board of health, or other similar body. Its responsible officer should be a psychiatrist, with special knowledge of mental deficiency and its many social expressions.

The local administration of this supervision could be carried out by the use of existing local public organizations, existing local private organizations and societies, or by properly qualified volunteers in each community. These peripheral workers could be made efficient by the use of suitable manuals, etc. This systematic supervision of the feeble-minded could easily be made to cover the entire State, with a local representative in each

community, but all under the direction of the central authority.

Each defective could be regularly visited and kept under observation by the local visitor. The reports of these visitors, covering the life histories and the family histories of many cases, would soon constitute an invaluable treasury of information as a basis for scientific research and study in the search for practical methods of prevention. The official visitor would advise the parents as to the care and management of the defective, and would have opportunity to inform the family, the local officials, and the community generally as to the hereditary nature and the peculiar dangers of feeble-mindedness.

The registration of every feeble-minded person, and the regular visitations, especially of children of school age, would make it possible to inform the parents of the condition of the child, of the probable necessity of lifelong supervision, and of the possible need for future segregation. Suitable, tactful literature should be prepared, which could be gradually presented to the parents in a way that would have great educational value. Sooner or later, the parents would probably be willing to allow their child to be cared for and trained in an institution if he needed such care. In suitable cases parents should be allowed to have the custody of their child, with the understanding that he shall be properly cared for and protected during his life, that he shall not be allowed to become immoral or criminal, and that he shall be prevented from parenthood. Whenever the parents or friends are unwilling or incapable of performing these duties, the law should provide that he shall be forcibly placed in an institution or otherwise safeguarded. The local representatives of the central bureau would officially serve as advisers and sponsors for pupils graduated from the special school classes, for court cases under probation and observation, and for institutional inmates at home on visit or on trial.

Under this plan there would be a person in every locality familiar with the opportunities for mental examination and methods of permanent commitment. The extra-institutional supervision and observation of cases in their homes would do away with the necessity of institutional care of many persons who would otherwise have to go to an institution, thus reducing the expense of buildings and maintenance.

There should be legal provision for the commitment of uncaredfor defective persons to the permanent custody of the central authority. This commitment should formally recognize the actual mental age and degree of responsibility of the defective person so committed. The legal status of a defective should be that of a normal child with a mental age of eight, nine or ten years. The permanent eight or nine or ten year mentality of the defective should be legally acknowledged.

The extra-institutional supervision should include cases dismissed from institutions, so that the defective who has spent many years in an institution would not be thrown out into the world with a freedom which he does not know how to utilize. In these cases, the supervision would constitute a permanent parole which would be most effective. This provision would enable the defective to be returned to the institution if he did not properly conduct himself in the community. Such provision for registration of the feeble-minded and for extra-institutional supervision would insure that those defectives who most need institutional training and protection would be sent to the institutions, and that those who can live safely and happily in the community would be allowed to do so.

The keynote of a practical program for the management of mental defectiveness is to be found in the fact, which seems to have been proved, that those defectives whose defects are recognized while they are young children, and who receive proper care and training during their childhood, are, as a rule, not especially troublesome after they have been safely guided through the period of early adolescence.

Every child automatically comes under the control of the school authorities between the ages of six and fourteen. Every case of mental defect can be easily recognized during this period. Present methods of health examination of school children could easily be extended so as to insure and require a mental examination of every child obviously retarded in school accomplishment. It would not be necessary to give a mental examination to all the school children. It would be sufficient to examine only those children who are three or four or more years retarded in school work, — perhaps 2 or 3 per cent of the primary-school population.

In the large cities, the mental examinations could be made by special examiners and at mental clinics. The rapid development of out-patient mental clinics all over the country will soon furnish facilities for such examinations in all the large cities. Rural communities and small towns could be served by a traveling mental clinic, as a part of the State government. This clinical

group, or even a single clinician, could examine the presumably defective children over a very large area. A visit to each small town once each year would be sufficient. Every institutional school for the feeble-minded should conduct out-patient mental clinics at the institution and in the various cities and towns served by the school. At the time of the mental examination, the parents should be informed as to the mental condition of the child and of his need for special training and protection.

Suitable manuals should be prepared by a State board of education, which could be placed in the hands of every teacher, especially in the rural schools, describing the methods of training and management that should be applied to these cases. It should be recognized that the defective child is entitled, even more than a normal child, to education according to his needs and capacity. The defective children who cannot be taught in the regular schools should be referred to the special classes or the institutional schools.

Cities and towns of over five thousand population are likely to have groups of at least ten or more defective children. Such communities should be required to establish special classes for defective children. The proper authorities should decide upon the courses of study and the equipment of school materials which are necessary for these special school classes. Provision should be made in the normal schools for training teachers of defective children. Every normal training school for teachers should be required to give suitable instruction to teachers to enable them to recognize probable cases of mental defect and to give them a general idea as to the training and discipline of such children. A State board of education or some other branch of the State government should prepare simple manuals of facts for the use of the parents of feeble-minded children. This literature should be prepared in series, with special articles for young boys, for young girls, for older boys, for older girls, and for other groups, and should kindly and tactfully instruct the parents as to the limitations of these children in the way of scholastic acquirements, and emphasize the importance of the development of habits of obedience and industry and the necessity of protection against evil influences and companions during the formative period, and of the possible need of institutional care in the future.

The great majority of mental defectives are of the moron group. If the plan suggested for the early recognition and the intelligent education and training of the moron in public schools

and at home is carried out, many of this class can be safely cared for at home. We have begun to recognize the fact that there are good morons and bad morons, and that it is often possible in early life to recognize the moron with antisocial and criminalistic tendencies, who will probably need institutional care. Morons from families unable properly to protect and control their children will need institutional training and care. The fact should be emphasized that the neglected moron is the defective who makes trouble later in life, and that during the formative period of his life he should receive proper care and training either at home, with the special help of the regular teacher or the special class, or in an institutional school.

The special public-school classes also serve as clearing houses for the recognition of defective children who are markedly antisocial and immoral, and who need permanent institutional care. It is an easy step from the special class to the institution. The children who graduate from the special school classes should have the benefit of follow-up or after-care assistance and help.

In the majority of States, the only provision for mental defectives is furnished by an institutional school for the feeble-minded, providing care and protection for a limited number of idiots and imbeciles, education and industrial training for morons, with permanent segregation for a certain number of defectives, and with special emphasis upon the lifelong segregation of feebleminded women of the hereditary group. It was formerly believed that it was possible and desirable to provide institutional care for practically all the mental defectives of the State. was before the actual extent of the problem was known and its cost computed, and before the difficulty of securing the commitment to an institution of many of these cases was realized. practice it has been found very difficult to insure the lifelong segregation of the average moron. The courts are as ready to release the defective as they are to commit him in the first However proper and desirable it may be in theory to insure the lifelong institutional segregation of large numbers of the moron class, it is a fact that there is a deep-seated prejudice on the part of lawyers, judges and legislators towards assuming in advance that every moron will necessarily and certainly misbehave to such an extent that he should be deprived of his liberty. That such misgivings are well founded is apparently shown by the studies made of discharged patients at Rome and Waverley. At Waverley a careful study of the discharges for

twenty-five years showed that a very small proportion of the discharged male morons had committed crimes, or had married, or had become parents, or had failed to support themselves, or had been bad citizens.

It has been fairly well demonstrated that the average male moron, without naturally vicious tendencies, who has been properly trained in habits of obedience and industry, and who is protected from temptation and evil associations during his childhood, can be safely returned to the community when he has passed early adolescence, if his family are able to look after him and give him proper supervision. A very much larger proportion of these trained male defectives would be suitable for community life if the above-described extra-institutional control and supervision could be provided.

The average citizen is not yet convinced that he should be taxed to support permanently an individual who is capable of 30 or 50 or 70 per cent of normal economic efficiency, on the mere theory that he is more likely than a normal individual to become a social problem. Thousands of morons never give any trouble in the community.

The after-care studies of the female morons who have received training in the institutions were not so favorable, but many of these, too, led moral and harmless and useful lives after their return to the community. The study of discharged female cases at Waverley showed a surprisingly small number who became mothers or who married. While it is true that defectives with undesirable habits and tendencies are not easily controlled, it is equally true that defectives who are obedient and moral and industrious are apt to continue these traits permanently. It is as difficult for them to unlearn as it was to learn. Those defectives whose tendencies are such as to make them undesirable members of the community should not be allowed their liberty, but should be permanently segregated in institutions. No other class of human beings so surely avenge neglect in their childhood, socially, morally, economically and eugenically.

Defectives who develop markedly immoral or criminalistic tendencies in the institutional schools for the feeble-minded should not be retained permanently in the institutions devoted to the care and training of the average defective, for the feeble-minded are most suggestible and easily influenced and should be protected from the companionship and influence of the defective with criminalistic tendencies. These "bad" defectives should be

committed to and cared for in an institution especially for that type, where the discipline could be made more rigid, and permanent detention more certain.

If 25 per cent or more of the inmates of our penal and correctional institutions are feeble-minded, as has been shown, it should be required that a mental examination should be made of all inmates of such institutions, and that those criminals who are found to be mentally defective should not be automatically discharged, to return to the community, but should be committed to a special institution for defective delinquents, and should be permanently segregated, and discharged only under the strictest sort of supervised parole. Provision should be made for the mental examination of all persons accused of crime when there is any suspicion as to the mentality of the accused.

There is no doubt that every State in the Union needs greatly increased institutional facilities for the care of the feeble-minded, not only as a matter of justice and fairness to the feeble-minded themselves and to their families, but as an investment that would repay the cost many times over.

There is no panacea for feeble-mindedness. There will always be mentally defective persons in the population of every State and country. All of our experience in dealing with the feebleminded indicates that if we are adequately to manage the individual defective, we must recognize his condition while he is a child, protect him from evil influences, train and educate him according to his capacity, make him industrially efficient, teach him to acquire correct habits of living, and, when he has reached adult life, continue to give him the friendly help and guidance he needs. These advantages should be accessible to every feebleminded person in the State. Most important of all, so far as possible, the hereditary class of defectives must not be allowed to perpetuate their decadent stock. The program for meeting the needs of these highly varied and heterogeneous groups must be as flexible and complex as the problem itself. It will be modified and developed as our knowledge and experience increase.

To sum up, the program now possible includes the mental examination of backward school children; the mental clinic; the traveling clinic; the special class; directed training of individual defectives in country schools; instruction of parents of defective children; after-care of special-class pupils; special training of teachers in normal schools; census and registration of the feeble-minded; extra-institutional supervision of all un-

cared-for defectives in the community; selection of the defectives who most need segregation for institutional care; increased institutional facilities; parole for suitably institutional-trained adult defectives; permanent segregation for those who need segregation; mental examinations of persons accused of crime and of all inmates of penal institutions; and long-continued segregation of defective delinquents in special institutions.

The above program would require teamwork on the part of psychiatrists, psychologists, teachers, normal schools, parents, social workers, institution officials, parole officers, court officials, prison officers, etc. There would be a highly centralized formulation of plans and methods and of authority, but much of the real work would be done in the local community. The degree of development of the program in a given State would depend upon existing knowledge and public sentiment on the subject in that State, and this in turn would be measured by the wisdom and experience of the responsible officials. Nearly every suggestion in the proposed program is already being followed in some State. No one State has anything like a complete program.

ENDOCRINE IMBALANCE IN THE FEEBLE-MINDED.*

BY OSCAR J. RAEDER, M.D., BOSTON.

The close relationship that exists between the internal secretions and the central nervous system has long been known. fine changes of temperament associated with the early stages of pregnancy, the varying neurotic conditions, from slight unrest to grave neurasthenia, that result from a dysthyreosis, is common knowledge of the observant internist and the trained neuropsychiatrist. So impressed were the ancients with the relation of the generative and gonadal influences on the mentality that they regarded the seat of hysteria in the uterus and named it accordingly. Cretinism is an example of a recognized endocrinopathy. The constant association of the athyrea with the marked hypophrenia and microsomia, disproportionate tissue growth, and other characteristics, stamp it as a frank ductless gland disease. The marked resemblance of certain factors in other kinds of feeble-mindedness with developmental anomalies, uneven growth rate, and various general and special tissue changes to the cretinic hypophrenia, has shown the desirability of further information in regard to the endocrinous factors in feeble-mindedness in general.

From the results of careful experimentation in physiology and biochemistry, and accurate clinical observation verified by pathologic study both during life and after death, modern scientific opinion is agreed that the development and growth of the animal organism is regulated to a great extent by definite and potent highly complex chemical substances called hormones, the internal secretions of the ductless glands. A constant change in the chemical balance occurs with the progressive periods of growth, more or less independent from the daily or continuous physiochemical balancing of the metabolic functions of the cytoplasm constituting the immediate life.

Besides this hormonic or chemical connection or interrelation between the various parts of the body we have another system which binds the parts together, namely, the neuronic or nervous system. It is by a smooth and well-ordered interworking of the neuronic and hormonic connecting systems that a being is kept in normal poise. An interruption of the nervous or electrical

^{*} From the Laboratories of the Massachusetts State Psychiatric Institute. Read before the ection on nervous and mental diseases at the seventy-first annual session of the American Medical Association, New Orleans, April, 1920.

control, or a disproportion between the various elementary substances or internal secretions forming the chemical combining system, or an altered condition of one or more of the constituent hormones, will destroy the balance between the two systems and result in an abnormal or pathologic state.

A great deal of attention and research has been devoted to the nervous control of the body and also its influence on the glands of internal secretion. I now propose to study the relationship to and effects of the internal secretions on the nervous system. As regulators of metabolism, to use the words of Noel Paton, they exert an influence on the growth and function of the brain and nervous system in general, as well as on the rest of the organism.

As a basis for this study, 100 cases of feeble-mindedness that came to necropsy have been taken in chronological order from the pathologic service of the Massachusetts Commission on Mental Diseases. They include cases from the Massachusetts schools for the feeble-minded at Waverley and Wrentham, and from other State hospitals.

The cases had been studied clinically in the routine method at the various institutions and after the standardized system developed by Dr. W. E. Fernald at the Waverley School, including Binet-Simon intelligence ratings. The necropsies were complete, including head, cord and soma in all cases, and were performed by Drs. M. M. Canavan and D. A. Thom according to the inclusive method outlined by Southard. The data, clinical and post mortem, were all collected in the usual way, symptoms and signs and pathologic changes and findings being noted by the regular examination methods. Thus, neither during life nor at necropsy was there any particular or special attention given from the endocrine point of view.

Data have been collected from a gross pathologic study of this series of brains and somatic organs, especially the ductless glands. In one-third of the cases a microscopic examination of the glands was also made. Aplasia, hyperplasia, pigmentation and interstitial change not due to age, glandular proliferation, anomalies, such as absence of accessory organs with lessened or increased function, besides special changes in the secreting epitheliums and cells of the individual, and various glands are the main factors included in our summation of the changes.

In a previous study,² the question of syphilis was considered. Attributing inflammatory and exudative changes, such as early arteriosclerosis, aneurysm, chronic periostitis, saddle nose, chronic

meningitis and vascular changes of a doubtful nature, to syphilis, we found eleven cases among those in which there were gland changes. Wassermann reactions were not obtained in many of these cases, so that reliance on grosser pathology was necessary.

Table 1. — Gland Changes.														
Extreme,														10
Marked, .														11
Moderate,														53
Absent, .														26

The incidence of glandular change is shown in Table 1. Under the designation "extreme changes" are classed those cases in which three or four glands were involved and in which there were marked anomalies of growth, underdevelopment, disproportion of body parts, such conditions as dystrophia adiposogenitalis, etc. There were two cretins.

In the second group 11 cases showed marked endocrine signs, in which at least two glands were involved, correlated with distinct changes in growth and anomalous development. Combining the first two groups, we have 21 per cent of cases showing presumptive evidence of marked internal secretory disturbance.

The third group included 53 cases in which changes of one or two glands were demonstrable, with irregular and unusual combinations.

Gland changes were entirely absent in 26 cases.

				External.	Visceral.	Cerebral.
Paresis (100 cases), .				23	29	27
Hypophrenia (60 cases),				73	58	75

Table 2. — Percentile Anomalies.

A tabulation of anomalies (Table 2), divided into external somatic, visceral, including the ductless glands, and cerebral, showed an interesting comparison. In the absence of data on normal individuals, 100 cases of paresis were selected. Paresis being in each case an acquired disease, it was assumed that they might be potentially representative of the normal type.*

^{*} Only 60 of 100 cases were selected to compare with the 100 cases of acquired disease because the combined 160 necropsies were performed by the same hand, insuring a more even and regular observation.

The marked preponderance of anomalous manifestation in the feeble-minded over the cases of acquired disease is striking. Attention is called especially to the third or cerebral group, in which 75 per cent of hypophrenics showed anomalies, compared with only 27 per cent of the acquired-disease cases, as significant of a possible influence of the growth regulating secretions on the development of the brain.

Among anomalies of development the stature first demands attention. Our observations on height agree in a general way with those of Shuttleworth,³ Tarbell,⁴ Wylie,⁵ and the compilation of statistics by Goddard ¹ in that we found the majority of patients undersized. In Table 3, percentile figures show 60 per cent varying from the normal, of which 51 per cent were undersized and 9 per cent taller than the normal given for their ages. Thirty-eight per cent were normal, allowing a variation of 10 centimeters as within normal limits. Data were not available in 2 per cent.

Table 3. — Hypophrenia: Stature in One Hundred Cases.

			311		 		 		Cent.
Undersized,					٠,				
Oversized,									9
Normal (\pm 5	cent	im	eters),	,					38
Unknown,									2

The question of growth has been studied experimentally in tadpoles by the feeding of various ductless gland substances in the laboratories of Gudernatsch and others. Gudernatsch 6 has shown that tadpoles fed with thymus are overgrown and underdeveloped; also, that examples of the same hatching fed on thyroid develop more quickly, but at the expense of size and weight.

In the curves on growth, Tarbell,⁴ and especially Goddard,¹ have shown that hypophrenics grow faster but stop sooner than normal children. Allowing for differences in comparative anatomy, the question arises whether this phenomenon may not be due to an imbalance of the thymus and possibly later also of the pituitary gland. Certainly the same overgrowth of the thymus-fed tadpole corresponding to increased height and weight in the preadolescent stage of the feeble-minded, as shown by Goddard's tables, and the underdevelopment or immaturity of the tadpole can be correlated later with the stunted development and hypophrenia of the abnormal child.

Table 4. — Adenoses.														
													Per (Cent.
Thyroid,														19
Pituitary,														40
Suprarenal,														27
α														38
Thymus,					•									12
														6

The incidence of changes in the individual glands is shown in Table 4. The pituitary gland was found involved oftener than any other gland, in 40 per cent of cases. The sex glands, the seat of numerous anomalies which brought their score up considerably, were second with 38 per cent. The suprarenal showed involvement in 27 per cent of the cases and the thyroid in 19 per cent. It is noteworthy that the thyroid falls so low in the scale. With the frequency of thyroid disturbances one might expect a larger number of cases showing a pathologic condition of the thyroid.

Numerous cases showed various combinations of glands involved. Table 5 gives the pituitary polyadenoses. It was involved singly in 14 cases. Pituitary with gonads, in 9 cases, was the most common dual adenosis, though there were combinations of sex and thyroid in 4 instances, sex and suprarenal in 4 cases, and in 3 cases the thyroid pituitary and gonads were affected in triple involvement.

Table 5. — $Polyadenoses$.														
	·													
Pituitary,												14		
Pituitary, sex,												9		
Pituitary, suprarenal,												5		
Pituitary, other glands	5,											11		

Furthermore, there were 6 cases in which the gonads were combined with three other glands; 2 included the gonads, thyroid, pituitary and suprarenal; 2, gonads, thyroid, pituitary and thymus.

Of the third two in which thyroid, pituitary, suprarenal and sex glands were involved, one was a female cretin, and the other an obese eunuchoid idiot who had been castrated in early life. He showed all the typical characteristics — undeveloped penis, and feminine appearance of breasts and extremities, with flabby pendulous abdomen.

REPORT OF CASES.

In order to illustrate the striking endocrine characteristics that were found in many cases of idiocy and imbecility, two of the cases have been individually charted and are shown in Figs. 1 and 2:—

Case 1. — History. — Fig. 1 represents a male idiot, aged ten years. He was admitted to the Massachusetts School at the age of six. He was 3 feet 9 inches tall and weighed 43 pounds; he was poorly developed and nourished, had chronic bronchitis, had a dry, coarse skin and sparse, coarse, wiry hair; there was a systolic heart murmur at the apex; the genitalia were infantile; there was an umbilical hernia, a protruding abdomen and poorly developed muscles; the hands were thick and short, with stubby fingers; the forehead was bulgy, the face asymmetrical, with large protruding ears; there was a chronic discharge from the nose; the tonsils were enlarged, with adenoids and a fissured tongue. There was some question whether or not the patient was a cretinoid idiot.

There were six children, of whom the patient was the second. The first three children resembled one another rather closely, and all died at the Massachusetts School for the Feeble-minded. Three later children were normal, one dying in infancy of diphtheria. An uncle and a sister of the patient had spinal trouble; the sister in question became partially blind. There was a feeble-minded and epileptic great-aunt. One of the mother's sisters was migrainous and obese; one living child of the sister had one arm not fully developed. Both the patient's mother and maternal grandmother are stated to have been nervous, and the patient's grandmother was also migrainous. On the father's side one sibling was deformed with spinal curvature. There was also an epileptic and feeble-minded great-aunt.

The patient began to talk at about one year and to walk alone at nineteen months. Peculiarities were first noted at two years. The patient had a peculiarity in speech, using "d" for the first letter. He was able to help in dressing and undressing himself and to feed himself with a spoon or fork.

School Progress, School Examination, Practical Knowledge and Economic Efficiency were all nil.

Social Reactions. — The patient was stubborn and irritable, running about in his own way, screaming when touched to be dressed or undressed, spitting on the floor, and yelling if he did not wish to be moved; he would not eat if any one was looking at him; he had lost capacity to feed himself, throwing food about; he was attracted by striking colors in dress. If given a toy, he would go by himself to play with it, screaming if another child went near him.

Psychologic Test. — The Binet test, performed in May, 1914, at the chronological age of eight years, gave the mental rating at one year.

Further History. — The patient required nursery care. He was in the hospital and infirmary most of the time, with untidy habits. He had frequent illnesses, including chicken-pox, measles, bronchitis and indigestion; he grew thin and developed a cough in November, 1915; he had a slight unilateral convulsion with twitching of the right side of the face. There was severe dyspnæa with mucus in the throat and a weak pulse. The patient showed symptoms of meningitis and remained comatose. Three days later slight paralysis of the right side developed, followed by death the next day. The cause of death was meningo-encephalitis and hydrocephalus.

In Fig. 1 are shown, first, the small stature and general microsomia; secondly, hydrocephalus; this was considered as being evidence of syphilis. A post-mortem Wassermann test was negative on the serum; thirdly, various dystrichoses, namely, hairy growth over the chest and abdomen, upper arms and forearms; abundant hair on back and neck, with absence of crines pubis and axillary hair. Over the head it was coarse and rough and arranged in multiple cowlicks; fourthly, microphallus, the penis being small with redundant prepuce. Besides these anomalies and abnormalities, the pituitary was cystic, and there was little sign of activity in the secreting cells of the anterior lobe and marked increase in the pigmentation of the posterior lobe cells.

ENDOCRINOSIS IDIOT

MICROSOMIA

HYDROCEPHALUS

DYSTRICHOSES

MICROPHALLUS

HYPOPHYSITIS LYMPHNODITIS

Fig. 1. — Case 1.

ENDOCRINOSIS MONGOLIAN IDIOT

MICROSOMIA
HYPOTHYREOSIS
HYPO-ADRENIA
HYPERTHYMIA
OVARITIS
HYPOPHYSITIS
LYMPHNODITIS
DYSGENITALISM

Fig. 2. — Case 2.

Case 2. — History. — Fig. 2 represents a female Mongolian, aged eighteen years, who rated three and one-half by the Binet intelligence scale. She was admitted to the Massachusetts School at eight years of age. At seventeen she was 4 feet $6\frac{1}{2}$ inches tall and weighed $72\frac{1}{2}$ pounds. She later increased 12 pounds in weight. The patient was fairly well developed and nourished; she was a mouth breather. The skin was coarse, the circulation poor; the heart sounds weak, with systolic murmur at the apex; the heart was enlarged; the fingers and toes were short and blunt; the face was asymmetrical; the eyelids were inflamed, the nose flattened, the tonsils large, and the tongue fissured. The Wassermann test was negative.

The patient was the first born of two children. The younger brother is normal. The father had an enlarged heart; he was of a gouty, asthmatic diathesis and died of a paralytic shock. He had an epileptic seizure at the age of thirty, and two more after marriage, one just previous to the birth of the patient. He had a violent temper and was subject to severe headaches. The parental fraternity was further checkered with nervosity and paralysis agitans, and there was a question of insanity. On the mother's side two brothers were epileptic, and a sister was backward. Two brothers and one sister are described as normal. A distant cousin had schizophrenia, and her brother was hypophrenic.

Peculiarity in the patient was noticed at one and one-half years. She began to walk and talk at two and one-half years; she was never able to say such words as "or" and "if"; she did not know the alphabet and could not read or count. She was tidy and could aid in dressing and undressing herself; she could use a spoon but not a knife and fork, nor could she tie her shoestrings. She was described as sometimes obedient and as being fond of picture books and blocks.

School Progress and School Examination were nil.

Social Reactions. — The patient was quiet and inattentive; her name had to be spoken to attract her attention.

Waverley School History. — The training class records show a deficiency in industrial adaptability. At twelve years she was described as clever at playing simple games, catching a ball, etc. Later on, after the age of twelve, she learned to sew and use scissors well. From 1905 to 1909 (age nine to thirteen years) she showed slow but definite improvement. She had changed under training from a repulsive, drooling, finger-sucking, untidy, stupid patient, taking short, choppy steps, to a tidy patient who had completed the first school course and had begun to take part in manual training. Her resistance to disease was low; she was subject to infections of various kinds. She was admitted to the hospital ward, April 23, 1915, with severe bronchitis and pleurisy. She died of tuberculous bronchopneumonia, May 26, 1915.

She was of the usual Mongolian type with the characteristic tissue and developmental changes. In Fig. 2 we have abridged the enumeration of these characteristics, showing microsomia, a very small thyroid and suprarenals, hyperplastic thymus, an interstitial inflammation of the ovaries and hypophysis, a general lymphnoditis, including tonsils and adenoids and dysgenitalism in the form of unequal labia majora, long urogenital cleft, large, prominent clitoris and high position of the mammæ.

Three of the Mongolians showed extreme glandular change; one showed marked involvement, and the fifth one moderate dysadenosis. Thus all 5 cases of Mongolianism showed gland changes besides the usual typical characteristics.

SUMMARY.

In this study the developmental, tissue and gland changes have been charted in 100 cases of feeble-mindedness that came to necropsy, taken in chronological order from the pathologic service of the Department of Mental Diseases of Massachusetts. Data found in the case histories and necropsy protocols were gathered in the regular way without reference to the endocrine point of view. It has been shown that 21 per cent of cases showed marked glandular involvement, with changes of a lesser degree in 53 per cent additional, making a total of 74 per cent in which there were signs of gland change. In 11 of these there were signs of syphilis. Not having Wassermann reactions in all cases, it may be argued that others of the glandular cases may have been syphilitic. Vice versa, some of those designated as syphilitic because of vascular or chronic inflammatory or exudative changes, may not have been syphilitic. Furthermore. the dysfunction of the endocrine system itself may be due in these cases to syphilitic influence on the secreting cells of the glands. In Fig. 1, though the hydrocephalus points to a possible syphilitic involvement, the Wassermann reaction was negative.

The pituitary has been found invaded more often than any other gland. The small stature so common in the feeble-minded may be correlated with this fact, in view of the powerful influence of the pituitary gland on growth.⁶

The gonads were shown to be affected in 38 per cent of cases. Also anomalous development was most rampant here. This is not remarkable when the embryology of the genital tract is considered. The similar, not to say identical, development of the urogenital tract in both sexes up to a certain embryologic stage, and then the more or less arbitrary determination for male or female would seem to give much more opportunity for anomalies, misdevelopments and malformations than in other parts of the organism where the developmental homonomy is not interrupted.

Macroscopic studies of the brain anatomy have shown numerous reversive types and evidences of arrested development or maldevelopment. Microcephaly, especially in the Mongolians, was common. Macrogyria, in one instance almost to absence of any fissuring in the frontal regions of the two hemispheres, was of frequent occurrence. Extraneous fissuring, "affenspalte" lateral inequality, microcerebellum correlated with sprawling

gait, and deficiency of parietal and occipital lobes with various degrees of exposure of the cerebellum, were some of the more striking changes found in the encephalon.

MICROSCOPIC EXAMINATION.

Among the microscopic findings, interstitial change, aplasia, pigmentation and varied staining reactions were noted. The pituitary was frequently found cystic; especially dilatation of the cleft in the pars intermedia. The cells of the anterior lobe showed varied staining reaction, the most common change being a deficiency of basophil cells. In the posterior lobes, marked pigmentation occurred in several instances in very young individuals.

The aplastic condition of the thyroid was present in the cretins. A hyperplasia of the glandular epithelium was noted in several cases, and increased interstitial elements were also common. In one of the Mongolians an infantile condition of the thyroid with absence of colloid was noted. In a few cases the vesicles were distended with colloid.

The testes usually showed signs of activity in all except the lower grades. The idiots' testes were either inactive and fibrous, or only feeble signs of spermatogenesis were found. The ovary was examined in only a few cases, but seemed less virile than the male gonads. Two cases of imbecility showed no ovarian activity, and in a third case only very slight evidence of function, one graafian follicle in a section, was found.

No characteristic changes were found in the suprarenal gland. In one case — a tuberculous subject — there was considerable involvement of both suprarenals with tubercles, numerous giant cells, etc. There were no signs of Addison's disease present.

Conclusions.

- 1. The evidence of gland changes observed in these cases by routine examination methods, clinical and post mortem, without particular reference to endocrinology, is so constant and multifarious that we cannot but regard them most seriously. There were gland changes of one sort or another in 74 per cent of cases. Marked gland changes occurred in 21 per cent.
- 2. With the constant and characteristic bony and soft tissue changes microsomia, lowered resistance to infection, poor cir-

culation, loose jointedness, and changes in the glands of internal secretion, Mongolian idiocy bids fair to be founded on an endocrine pathology.

- 3. The internal secretions begin to exert their influence early in the life of the organism. It is known that permanent adjustments of the other glands and tissues follow on the absence or dysfunction of one gland or set of glands. In order to avoid such permanent changes as infantilism, dwarfism, acromegaly, microcephaly and feeble-mindedness, it is imperative that these conditions be recognized and remedied by supplying the deficient hormone or inhibiting the hyperfunction of a gland early in the course of the disease. After permanent adjustments have formed, improvement is difficult; with early treatment, results are often little short of marvelous.
- 4. Much of the finer pathology of the ductless glands is concerned with biochemical reactions. Further studies of feeble-mindedness by physiochemical and roentgenologic research would no doubt throw more light on this obscure field.

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THE FIRST THOUSAND AUTOPSIES OF THE PATHO-LOGICAL SERVICE OF THE MASSACHUSETTS COMMISSION ON MENTAL DISEASES, 1914–1919.

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AND

Douglas A. Thom.

On the basis of inquiry, both public and private, concerning what action was taken in State hospitals for the insane regarding accidents and unexpected deaths, the State Board of Insanity members, composed of Michael J. O'Meara, M.D., L. Vernon Briggs, M.D., and Charles E. Ward in 1914, asked its pathologist, E. E. Southard, for a scheme by which the central board could have on file an unprejudiced report of the deaths, sudden or unexpected, occurring in the hospitals under its jurisdiction. This was a continuation of the philanthropic investigation of Dr. L. Vernon Briggs in the care of the unfortunate coming under the law.

A plan was formulated by which an assistant or assistants should be appointed to visit the hospitals on notification to be present at or to perform autopsies on cases of sudden or unexpected or violent deaths, making investigation of the circumstances attending such death as the occasion demanded. Feeling sure, however, that medico-legal cases, important as they were, would be but a small per cent of the deaths in each hospital, and that such cases would speedily become routinized, it was also arranged that autopsies should be added which should be of value to the clinicians of the hospitals where no laboratory was established, and the tissues serve as a collection for intensive group study in the central laboratory which should shortly follow the collection of such material. The letter sent to the various hospitals follows:—

JUNE 29, 1914.

The State Board of Insanity has decided to develop the work of its pathological department on new and broader lines and has accordingly appointed an assistant to the pathologist, viz., Dr. Myrtelle M. Canavan, formerly pathologist at the Boston State Hospital.

The State Board desires to have its pathological department represented at autopsies performed at all hospitals, both public and private, upon cases of unusual importance, whether from a social, pathological or research point of view.

First, as to the cases of social interest, in addition to the statutory notice to the board, the board asks that its pathologist be immediately notified by telegraph or telephone of all cases of suicide or homicide, sudden death, and any cases to which the medical examiner is called, addressed to Dr. E. E. Southard, 74 Fenwood Road, Boston.

Secondly, as to cases of pathological or research interest, the board desires (a) so far as possible to provide an autopsy service of institutions not maintaining such a service; (b) to supplement existing autopsy services by providing for emergencies, such as absence or disability of the institution pathologists; (c) to offer aid in special work on certain epidemics; (d) to aid in the exchange of research material which the various institution pathologists are from time to time working on; and (e) to carry on certain independent researches.

The Board of Insanity has made arrangements with the trustees of the Boston State Hospital for space to equip and maintain laboratory rooms at its psychopathic department. Your co-operation is solicited in a step which must be regarded as of great importance in the development of the State's scientific work in psychiatry, and in the further performance of the board's statutory duty to "encourage scientific investigation by the medical staffs of the various institutions under its supervision." (Acts of 1909, chapter 504, section 6.)

The State of Massachusetts with thirteen institutions caring for the insane, epileptic and feeble-minded, like similar small States having adequate train and trolley service, lends itself to such an arrangement provided the calls are not too numerous to be answered on the next train. The situation, involving an unpleasant duty (to investigate sudden deaths), was thus utilized to forward research. A central laboratory was begun to manage the collection, to care for the tissues and to prepare sections, and after a few months a technician was installed and a secretary. The nucleus established, calls came in from all quarters for autopsies, viewing of bodies and assistance in epidemic studies, suggestions about laboratories, methods of study, problems of interest, etc., moreover, the laboratory was utilized for teaching neuropathological technique to graduate and undergraduate students, technicians for State hospitals, etc. Student internes in the psychopathic department early saw the value of getting actual contact at autopsy service and doing laboratory work afterward on specimens, and often went in turn or in crews to assist at the necropsies. To date twenty-eight graduates, undergraduates and technicians spending from two weeks to two years have availed themselves of this opportunity.

The various hospitals where autopsies were rare necessarily had but meager equipment grown rusty and many pieces missing

from an historic set of tools, but cases which puzzled or perturbed the staff were readily turned over to the pathological service for study. Trying to do standardized work under all conditions has met with amusing difficulties as might be related by the assistants, M. M. Canavan, D. A. Thom or O. J. Raeder.

A great number of patients dying in the State hospitals without relatives or friends to claim their bodies are available for post-mortem study in Massachusetts by virtue of section 5 of chapter 77 in the Supplement to the Revised Laws of 1902–08, page 622. This amendment (section 5) states:—

Where the cause of death cannot otherwise be determined the chief medical officer of the institutions named in section one shall have power to cause autopsies to be made upon bodies unclaimed by relatives or friends, before surrendering the same to such persons and in such manner as are specified in sections one and two of this act.

Sections 1 and 2 referred to, of the Revised Laws of Massachusetts, 1902, Vol. I, chapters 1–108, page 689, state:—

Section 1. Upon the written application of the dean or other officer of any medical school established by law in this commonwealth, the overseers of the poor of a city or town, the trustees for children, the pauper institutions trustees, the insane hospital trustees, and the penal institutions commissioner, of the city of Boston, the trustees and superintendent of the state hospital, state farm or other public institution supported in whole or in part at the public expense, except the soldiers' home in Chelsea, shall give such dean or other officer permission to take, within three days after death, the bodies of such persons who die in such town, city, city institution, state hospital, state farm or public institution as are reguired to be buried at the public expense, to be used within the commonwealth for the advancement of anatomical science; but such permission shall not be given to take the body of any soldier or sailor, known to be such, who served in the war of the rebellion or in the war between the United States and Spain. In giving such permission, regard shall be had to preserving as far as practicable a fair proportion between the number of students in attendance at such institutions and the number of such bodies delivered to them respectively.

Section 2. Such dean or other officer, before receiving any such dead body, shall give to the board or officer surrendering the same to him a sufficient bond with condition that such body shall be used only for the promotion of anatomical science within this commonwealth, and in such manner as in no event to outrage the public feeling, that, after having been so used, the remains shall be decently buried, that it shall not be so used for fourteen days after death and that it shall, during said fourteen days, be kept in a condition and place to be viewed by any person, at all reasonable times, for the purpose of identification.

A question arose at one time as to whether relatives not wishing an autopsy performed but unable to pay for the expense of burial were entitled to the objection. The Attorney-General was consulted and ruled as published in Bulletin of the Massachusetts State Board of Insanity, No. 19, of March, 1916, pages 13, 14.

Boston, Feb. 1, 1916.

State Board of Insanity, State House.

Gentlemen: — I beg to acknowledge your request for my opinion upon the following question: —

Has the Danvers State Hospital a legal right to perform an autopsy on the body of a deceased patient at the expiration of seventy-two hours following death, if the relatives object to autopsy, and said relatives are either unable or unwilling to assume the expense of burial?

The only provision of law which I find bearing upon your question is section 5, which was added by amendment to Revised Laws, chapter 77, by Statutes of 1902, chapter 417. That section is as follows:—

Where the cause of death cannot otherwise be determined the chief medical officer of the institutions named in section 1 shall have power to cause autopsies to be made upon bodies unclaimed by relatives or friends, before surrendering the same to such persons and in such manner as are specified in sections one and two of this act.

The provisions of this section authorize autopsies only "upon bodies unclaimed by relatives or friends."

Section 3 of chapter 77 of the Revised Laws provides that bodies of deceased persons shall not be given up for dissection by public institutions if "any person claiming to be and satisfying the authorities that he is a friend or is of kindred to the deceased asks to have the body buried or surrendered to himself."

In my opinion a body is unclaimed within the meaning of section 5 if no person satisfied the authorities that he is a friend or is of kindred to the deceased and asks to have the body surrendered to himself. A body is not, in my judgment, claimed by friends or relatives merely because they ask to have it buried at public expense. It follows that in cases "where the cause of death cannot otherwise be determined" an autopsy may be performed upon a body of a deceased patient by the chief medical officer of the Danvers State Hospital, provided within a reasonable time after the death of the patient no person satisfies the authorities of that institution that he is a friend or is of kindred to the deceased and asks to have the body surrendered to himself. In such cases this may be done even though persons claiming to be friends or relatives ask to have the body buried and decline to consent to the autopsy.

Yours very truly,
HENRY C. ATTWILL,
Attorney-General.

The second question arising is the time which must elapse between death and autopsy. There is a current tradition that this may be performed at the end of seventy-two hours, but that is tradition or a convenient figure to remember and is not the wording of the law which states: "... the trustees and superintendent ... shall give such dean or other officer permission to take, within three days after death, the bodies of such persons ...", etc. Naturally if they are to be taken within three days the autopsy must precede this; how much it may precede is according to the individual reaction of the chief medical officer. Some believe it to be one hour after death, others twenty-four to forty-eight hours, at the end of seventy-two or after seventy-two hours. Some advertise and decide upon an autopsy fifteen days later.

All has been grist to the mill. Every case has been of value, often of greatest service from the standpoint of public health: for example, an imbecile dying of an unrecognized disease yielded a pure culture of typhoid fever from his spleen thirteen and one-half days after death. Measures were adopted to prevent an outbreak of the disease from contacts in this ward. Another dying after an operation for a supposed carcinoma of the stomach was proved to be a chronic dysentery carrier with deeply ulcerated transverse colon.

Frequent findings of unsuspected pulmonary disease (pneumonia) thought to have been a cerebral hemorrhage, and demonstration of heart lesions when pulmonary tuberculosis was thought to have been the cause, and vice versa, show the value of post mortems from a diagnostic medical side. It is so easy to ascribe chronic bizarre complaints to delusions and come off victorious that somatic complaints are little heeded. A football sized pelvic bony tumor was entirely missed in a woman who lay in bed moaning with leg pain. Surgical lesions are naturally overlooked and unoperated due to a perversion of symptoms or defective registration of pain or temperature in the insane, partly due to the anatomical anomalies present; examples of this are worthy of hote in excess of colon at pelvic brim which becomes twisted upon itself; acute obstruction symptoms become evident, enemas only aggravate the condition, and laxatives by mouth increase distention.

The medical examiners' cases have been of social interest. The hospitals have been protected from the public in the double visitation of the pathologist's assistants and the medical examiner of the district to whom all sudden and unexpected deaths are

reported. If there is evidence of foul play, he causes an autopsy to be done. If the case is clearly due to "natural" causes he waits for the autopsy findings before filling in the certificate. The most cordial relations have existed between the medical examiners and the assistant pathologists and the hospital authorities.

The number of medical examiners' cases (not counting those released by him) have been 97 or 9.7 per cent of the cases.

The public is much more alarmed by memories of stories told or newspaper reports than can be verified by this experience; there are now and then unsuitable persons taking care of the insane. There is the male "Sairey Gamp," the bully whose world is small and who takes pleasure in being "superior" to the patient, who feels perhaps for the first time a sense of power and annoys the patient to see him react; when he reacts unexpectedly trouble follows and it is not often that an attendant is seriously hurt in a hospital for the insane. When two or more attendants are responsible for a man's death it is difficult to fix the responsibility, and the court appears to divide and lighten the sentence (1) on the shifting evidence, (2) on the ground that the patient was insane, (3) his bones were not as strong as a normal man's, (4) his muscles were not so well co-ordinated, and (5) he may have provoked the attack. A case in point: The attendant spoke to an Italian, roughly ordering him to go to bed. The Italian retaliated verbally; a slap from the attendant resulted in an attack and they fell to the floor, the other attendant rushing to the rescue. twenty minutes the patient was dead with a fractured skull and many ribs broken. The attendants were jailed for two years!

This extreme case must be considered in the light of the maximum and unusual happening, since the medical examiner's cases include all grades of sudden death from homicide to the innocuous coronary sclerosis, and thousands of contacts are maintained every day with patients who are far from agreeable.

From a purely psychiatrical side the post mortems have again been of value diagnostically to the physicians, who are always enlightened if the case was or was not paresis, brain tumor, meningitis, hemorrhage, or softenings. Our stewardship would be vindicated if we only stopped there, but this task of giving information and collecting data under all weather conditions for the physician and in all states of refrigeration for the bodies permits an unselected curve of material. It has been noted that standard work has been maintained under unstandardized conditions, but the technique has been of high order, head, trunk and cord being examined almost without exception, many cul-

tures taken, and blood and fluids examined by the Wassermann and other techniques. Objective descriptions have been type-written and bound, and sections have been made from each organ and cord for fixation in Zenker and formalin in which latter the brain has been suspended.

Eighteen photographs have been taken of the majority of these 1,000 brains; they are mounted on large cards so that in five minutes a good judgment of the value of the brain for microscopic study can be made without the formalin specimen at hand. These brains are rarely histologically sectioned until the question of a study is made, when all of a group is assembled, selection made of the most characteristic, and intensive work begins. Thus the most information for the least handling is obtained and eyestrain is lessened.

The cords have always been examined for (1) cell findings; (2) tract changes. In the words of the senior author, we get the "news from the nervous system" regarding exudation in the meninges or about the vessels, cell change or loss, tract degenerations that focus our attention on the cord or brain.

The trunk organs have been rarely sectioned unless a point has been raised; the ductless glands have had first choice of attention after the nervous system. With 250 autopsies each twelve months, a minimum must be made if any group research is attempted. It has never been plain why general pathologists do not remove the brain and cord. Our problem would have been much easier if we had access to normal brains and cords; indeed, years elapsed before our laboratory had control of any material which answered the purpose of normality.

The material of the first 1,000 cases collected through the activities of M. M. Canavan and D. A. Thom has been arranged according to the eleven groups of the senior author.

		~	•								
		ONE	Тно	USAN	D A	UTOP	SIES	•		Pe	er Cent.
I.	Syphilitic, .										12.0
II.	Feeble-minded,										9.2
III.	Epileptic, .										9.4
IV.	Alcoholic, drug	, poiso	n,								5.2
V.	Focal brain (or	ganic,	arte	riosc	lerot	ic),					7.2
VI.	Bodily disease	symp	toma	atic),							2.0
VII.	Senescent, senil	e, .									8.9
VIII.	Dementia præce	ox, pa	raph	renic	,						20.7
IX.	Manic-depressiv	ve, cy	cloth	ymic	·, .						5.3
X.	Hysteric, psych	o-, ne	urast	heni	c,						0.0
XI.	Psychopathic, r	aranc	iac,								20.1

It will be observed that the percentage roughly follows the percentage of like cases in Massachusetts State hospitals, with the probable exception of Groups X (that do not die) and XI (which is too large). This latter group would thin out on careful consideration and many cases be reinstated in other divisions. It is this group which would be of immediate interest to those of the reformer type of mind, and it has been a cherished hope that a research man could be appointed for each of these groups for both clinical and histological approach.

On the basis of these 1,000 autopsies a book is under way which will emphasize the value of the data collected, describe the groups, and illustrate the cases selected with careful analysis of them. We hope to show the pitfalls and the rewards to the pathologist who approaches clinical material from the side of the laboratory.

REFERENCE.

1. RAEDER, O. J.: "A Study of Fat in Cerebral Cortex." Archives of Neurology and Psychiatry, May, 1919, Vol. I, pp. 525-534.

INTERIM REPORT ON THE NEUROSYPHILIS INVESTI-GATION OF THE MASSACHUSETTS COMMISSION ON MENTAL DISEASES.*

BY OSCAR J. RAEDER, M.D.,

ASSISTANT IN NEUROPATHOLOGY, HARVARD MEDICAL SCHOOL; ASSISTANT PATHOLOGIST TO MASSACHUSETTS COMMISSION ON MENTAL DISEASES, BOSTON.

There is probably no clinic in the country where intensive treatment of neurosyphilis with Ehrlich's salvarsan, as outlined by Southard and carried out by Solomon, has attained greater proportions or has spread its ramifications more extensively and persistently into the community than it has in Boston. This pervasion of the Commonwealth through the social service channels has permitted the collection of statistics so extensive that they may be regarded in a way as an index of the extent of luetic incidence in the population in general. This figure is given at 15 per cent for psychopathic hospital cases. The index for the general population would be, we assume, somewhat lower.

		T^{A}	BL	Е 1	$-N\epsilon$	euro	syphi	ilis I	Thero	ipy,	1914-	-19.	Case	es tr	eated.
A.	Working	gora	at s	chool	., .										108
В.	Private	care	(in	nprov	ed),										13
C.	Hospital	Ι,													125
D.	Lost,									٠.					93
E.	Died,														89
	Tot	al,													428

Since the institution of systematic syphilitic treatment at the psychopathic department of the Boston State Hospital in March, 1914, 1,654 cases with positive or doubtful Wassermann reaction have been examined. Of this number, 428 seropositives (including 71 cases at the Worcester department), which were found to be neurosyphilitic by examination of cerebrospinal fluid or other tests, have been treated. Two hundred and forty-six are known to be now living. These are divided into three groups: (A) which includes 108 cases who are working or at school; (B) 13 under private care; and (C) 125 who are

^{*} Read at the seventy-fifth annual meeting of The American Medico-Psychological Association, Philadelphia, Pa., June 18-20, 1919.

under custodial care. Of the remainder, 93 are unaccounted for, and 89 have died. The most successful cases, those who are working either without treatment or under interval observation, are included in classes A and B, and among those unaccounted for. The period of this work having extended over longer than four years, many cases have drifted away and become lost to us.

Cases which have not been under treatment at least three months are not included in this report.

Omitting the cases that have been lost, and taking into account only the 108 cases at school and work plus 13 cases improved under private care, we have 121 or practically 30 per cent improved.

There are, of course, an additional number of cases among those at present in class C, the hospital group, which will show improvement. Arrested or stationary cases with considerable defect are not included among the improved cases. It now and again happens that cases so classed who seem unpromising—indeed a "drooling dement" in one instance—improve and are discharged in good condition. In the case mentioned, the patient cleared up after several months' treatment and has been working for over a year in good mental and physical condition. This would furnish an additional source of potential improvements which are not included in the above 30 per cent improved.

DIAGNOSIS AND TREATMENT.

We are agreed with most syphilographers that one of the principal factors in the successful treatment of neurosyphilis is early diagnosis. With this object in mind it has been the custom at the psychopathic department to apply the Wassermann test to the serum and spinal fluids of spouses, children, or parents of syphilitics. In a "Family Study of Syphilitics," Solomon and Solomon were able to report from 23 to 35 per cent of the members syphilitic.

By this method it has been our good fortune to cull certain early asymptomatic cases of neurosyphilis, besides numerous instances of positive Wassermann reaction in blood only and congenital syphilis.

We feel that most of these early cases of neurosyphilis, had they been allowed to progress without treatment, would ultimately classify themselves into definite subgroups of neurosyphilis, e.g., paretic or tabetic types.

(A). The Diagnosis of Neurosyphilis.

The most common forms of neurosyphilis, the paretic and tabetic types, are ordinarily recognized with little difficulty. The various forms of paresis, excited mania, slow dementing and other types are usually developed to an unmistakable stage when the physician is consulted.

The unusual cases, however, those of doubtful color, are the problems for laboratory analysis and diagnosis. These early border-line and atypical cases in which the clinical signs are vague — a single fainting spell or slight convulsion; a slight lassitude or lessened ambition; headaches referable to no particular cause — should all be analyzed for neurosyphilis. It is for this class of cases, — where the destructive syphilotoxin has invaded but not yet gained a foothold in the nervous system, the early cases, — in which treatment with salvarsan offers the most, that we make a special plea to the general practitioner and the general hospital clinician for early diagnosis.

In the general medical and nerve clinics or psychopathic hospital out-patient clinics these cases are frequently seined out. It is this early or "psychopathic hospital" group which usually responds to treatment with an arrest of the process or even recovery. If allowed to slip through the diagnostic net here, they later develop a distinct differentiated type of neurosyphilis and enter the committed or "state hospital" group as paretics in which the reaction or treatment is less prompt and much less certain. No obscure case of the nature mentioned above should be relegated to the psychoanalysts or labeled psychoneurotic until neurosyphilis has been excluded by careful spinal fluid examination.

From observation we believe that a positive diagnosis of neurosyphilis, i.e., syphilitic inflammation of the central nervous system of any form, can definitely be made from laboratory findings when clinical evidence is either yet absent or of such a mild form that neither the patient nor his family are aware of it. We have found several cases in which the spouse of a paretic has shown Wassermann reaction on serum positive, Wassermann reaction on fluid positive, increased cell count, globulin present and albumin increased and a distinct gold sol reaction in which there were as yet no mental or physical signs.

Table 2. — Familial Syphilis.

FAMILY A.

	\GE.			RMANN RE-	Globulin.	Albumin	Cells.	Gold Sol.
A	GE.		Serum.	Fluid.	Globuin.	Albumin.	Cens.	Gold Bol.
			+	+				
F. 33,					2	2	269	5555443210
М., .			+					
13,			+	+	0	N	1	5555441000
12,					0	N	0	•
9,			+	-	0	N ·	1	0012100000
8,			+	-	0	N	0	0033310000
4,			-					

Again, we have noted (Tables 2 and 3) in the siblings of juvenile neurosyphilitics a varying degree of positive laboratory findings—the older child may be distinctly paretic, a frank case of congenital juvenile paresis. The younger children will show varying degrees of syphilitic involvement. For example, the next in order of birth may show a Wassermann reaction on serum positive, with a modified gold sol in the syphilitic zone—a later birth will show an entirely negative laboratory picture. This rule, that the further removed from the parental infection the more attenuated the virus in the offspring, has been almost constant in our cases.³

Table 3. — Familial Syphilis.

FAMILY B.

	AG	Yai	WASSERM ACT	IANN RE-	Globulin.	Albumin.	Cells.	Gold Sol.
	AG.	E.,	Serum.	Fluid.	Globulin.	Albumin.	Cens.	Gold Sol.
F.,			- -	-	0	N	0	0000000000
М.,			No test.	No test.				
	12,-		+	+	0	N	37	5555531000
	6,		+		0	N	1	1111210000
	5,		- 4	/ - 1	0	N	0	0000000000

Here it seems logical, other diseases excluded, that the syphilitic toxin is responsible for the gold curve in the younger children. Thus, with absence of characteristic clinical signs the diagnosticopositive laboratory combinations in the order of relative positivity are as follows: First, Wassermann reaction on serum positive, Wassermann reaction on fluid positive, with syphilitic gold curve, second Wassermann reaction on serum positive, Wassermann reaction on fluid negative with modified gold curve, that is, one reacting in the syphilitic zone. We could therefore be reasonably certain of a diagnosis of neurosyphilis with a positive Wassermann reaction on the serum and a gold reduction in the syphilitic zone.

There are, no doubt, cases of neurosyphilis where the destruction wrought has been either so slight or of such a mild degree as to escape the most sensitive tests of the present-day laboratory. It is also quite possible that such fine degrees of neurosyphilis might either remain stationary or resolve spontaneously. But until we know of a reliable method of sorting out such cases we are bound to treat all cases with positive evidence of syphilis no matter how meager.

Table 4. — Neurosyphilis ($(Diagnosis\ Ex)$	Nocentibus).
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						IANN RE-	Cells.	Gold Sol.
					Serum.	Fluid.	Cens.	Gold Sol.
First test: —								
State laboratory,							0	0000000000
City laboratory,					±			
Retest,								
Second test (after arsphenamine).	two	injec	tions	of	_	+	53	2442330300

Another angle of attack is the so-called "provocative" method (Table 4) in which the diagnosis is made on the evidence of a Herxheimer reaction. This is positive evidence of luetic involvement since a neurorecidive never follows administration of a trepanosomocide in non-luetic cases.⁴

The case cited in Table 4 was that of a man aged thirty-eight who had made almost a complete recovery (slight loss of power in arm) from a hemiplegia three years previous and now came to the hospital for mental disease. Though all tests were negative

on first examination, — excepting that the Wassermann reaction on serum in a second laboratory was ±, but negative on a second specimen submitted, — two weeks later, after two injections of arsphenamine, the Wassermann reaction on fluid was positive, there were 53 cells and a gold curve of a paretic type.

(B) Treatment of Neurosyphilis.

As a systematic working basis, we have chosen a time span of three months during which intensive treatment with arsphenamine and mercury is given. This is usually sufficient time to determine whether a case will react favorably or otherwise.

During this period the following method is carried out: The case is put on combined treatment with mercury and salvarsan. If there are no reactions of intolerance after the first two doses of .3 gram and .5 gram of arsphenamine, respectively, the treatment is continued in large doses (.5 to .6 gram) biweekly for a period of four weeks, or approximately eight injections.

The arsphenamine is then rested and mercury is allowed to continue at 1 grain doses weekly. The therapeutic rest in the arsenotherapy avoids an anaphylaxis, which develops in most cases if treatment is continued at such rate and dosage.

After four weeks the arsphenamine is resumed and another series of eight injections, same dosage, given. The mercury is usually discontinued through the third month; the object here again to keep the organism in a state of saturation short of salivation. This constitutes a course of intensive treatment. A retest of the serum and spinal fluid is then made.

We find now that in many cases the Wassermann reaction on the serum and in a lesser degree the Wassermann reaction on the fluid have become negative. The cell count is usually markedly reduced, the globulin content reduced and an appreciable improvement in the gold sol curve. Concomitant with the laboratory findings, there is a marked improvement in the mental symptoms, — confusion cleared, memory partially or entirely restored, euphoria dampened, so that the patient begins to have some insight.

Another class of cases does not show as rapid change and requires further intensive treatment after a short therapeutic rest. Here a second course of treatment is administered combining potassium iodide saturation with the mercury and arsenic. To this second concerted attack a further number of these reluctantly yield, but not so evenly. The positive Wassermann

reaction on the fluid may persist, or, after change to doubtful and negative, may return to positive. Or the cell count may remain high, especially in diffuse types. The gold sol will continue positive or show only slight change. With these laboratory signs, however, there frequently occurs marked improvement in the mental and clinical states.

The patient is frequently discharged, resumes his work or obtains employment of a similar type and reports in the outpatient department. These cases usually become chronic from a laboratory and neurological standpoint, though they remain clear mentally; or, a positive Wassermann reaction on the fluid may linger though the Wassermann reaction on the serum stays negative.

A third class of cases rapidly dement and decline, following the course of paresis to dilapidation, which has been so common in institution cases.

Here it will be convenient to divide the cases into a "custo-dial" or committed to hospital group and a "psychopathic hospital" group.

The custodial care group includes the well-developed, full-blown case of general paresis with dementia, tremors, speech defect and the classical reflex changes. If not already begun, the paralytic symptoms soon develop and are followed by trophic disturbances. This is the late case in which the period between the onset of symptoms and institution of treatment has been too long, not necessarily by actual time, but gauged by the amount of progress in the disease; the time varies in different cases.

The psychopathic hospital group includes cases of shorter duration. A slight character change or unwonted irritability has been noticed by the spouse for the past two or three months. Amnesia and slight euphoria and lack in concentration with inability to carry on; or the only sign of a neurosyphilis may be a convulsion or fainting spell for which the anxious patient or frightened wife resorts to the psychopathic hospital.

On examination an Argyll Robertson pupil may be present or deep reflex changes with slight Rombergism, mild tremors — one or several — or entire absence of these neurological danger signs may be found. The latter class is the more favorable for treatment and yields more readily and completely to the intensive use of salvarsan.

The question of remissions has been studied: Remissions with apparently more or less degree of recovery, at least of the former

mental state, and extending over various periods of time according to different writers have always occurred. A careful analysis of remissions of untreated cases has been made by Solomon,⁵ who is quoted as follows: Out of 300 untreated cases but 5 were found capable of self-support and 10 more who appeared to be in normal remission. Whereas, of the treated cases there were 50 out of 200 capable of self-support. This number has slightly increased since this investigation, one and a half years ago.

The question of a cure is a much debated one. Mott ⁶ quotes Dreyfus, who states that "only after the cerebrospinal fluid gives all normal reactions may a cure be said to be obtained." Following this dictum in such cases where a positive reaction of one sort or another, say a gold sol with a slight amount of globulin only persists after the most intensive and prolonged treatment, all clinical and other signs having disappeared, shall we still continue to treat?

Hoche,⁷ writing on the curability of neurosyphilis, seems to take almost too lenient a view. He states that we cannot be prevented from speaking of cures on account of organic scars, such as reflex findings, or even permanent psychic defects, such as defective memory, lack of concentration and slow ideation, which may be due to cell destruction.

We prefer not to designate as cured cases with so considerable a resultant defect. It seems to us that the term "arrested" or "stationary" is more reasonable. On the other hand, we feel that it is not necessary to be as ultraconservative as Dreyfus and would be willing to call the cases cured if the Wassermann reaction has become negative in the blood and fluid, globulin and albumin practically normal, cells reduced to within 5 and a slight gold reaction in three or more tubes, with partial reduction in the syphilitic zone, provided, of course, the patient had mentally recovered and would show no more organic defects than an Argyll Robertson pupil or a pathological knee jerk, for example.

COMPLETE CURES.

A complete recovery—mental, physical and laboratory—after less than five years or ten years or even before death may be questioned. An apparently recovered neurosyphilitic may show none of the above signs or findings, yet at autopsy, following intercurrent disease of senility, a focus of inactive treponemas may be found to occupy a circumscribed area some-

where in the brain, just as we commonly find an area of fibrosis or calcification in the lungs, the scar of a healed tuberculosis.

Yet we have two cases, one of the "psychopathic hospital" group, the other of the "committed" group, which might be discussed as complete recoveries as far as clinical and laboratory examinations will show. Both these cases showed positive serology of neurosyphilis of the paretic type. Neurologically one had seizures and was somnolent; pupils and other reflexes showing no change. Mentally there was depression, irritability, amnesia, cephalalgia, photophobia with eye pain (cranial nerve involvement?), bulimia, fatigue, lack of insight, — but all to a mild degree.

After intensive treatment extending over a period of almost three months of 25 injections and a total of $10\frac{1}{2}$ grams of salvarsan with mercury, the serology and fluid became entirely negative including Wassermann on the blood and spinal fluid, cell count, globulin, albumin, and gold sol tests. Neurologically there were two convulsions after treatment was given but none since. Photophobia and eye pain have disappeared. Mentally entirely clear. Patient has been working regularly and continuously for two and a half years since his recovery and is at present apparently normal and working. This was probably a case of "paresis sine paresi" which cleared up with treatment.8

The other case showed laboratory findings positive for neurosyphilis of the paretic type including all the tests. Neurologically knee jerks were diminished, tremor of fingers, vesical incontinence. Pupils, nothing abnormal. Mentally there were depression, paranoid ideas, retardation, mutism, and visual hallucinations. He was also regarded as showing dementia.

After intensive treatment, which in this case was late in its inception, but extended over a period of ten months, during which period a total amount of 15 grams of diarsenol were given intravenously, the patient showed marked improvement. During the course of the treatment patient suffered a right hemiplegia which was temporary and cleared up promptly. Patient has recovered entirely from his mental symptoms, memory restored, insight good, conduct and judgment good. Neurologically there is a slight inequality in pupils but they react normally.

The laboratory findings have become entirely negative, the patient has been working for over a year, holding the same job which he took nine days after leaving the hospital. In this

case the only sign or scar is a slight inequality in pupils which were equal on first examination.

We have endeavored to get late information on other inactive cases, but many such, who probably are similar to the cases just described, refuse to come for consultation, being too busily and more profitably than ever before employed at the ship-yard, trades, etc., doing war work.

Our most favorable cases are those which are most difficult to follow, since being objectively and subjectively recovered, they feel it useless to further remain under observation, and are frequently lost.

		TA	BLE	5	— To	xic I	React	ions.			
Toxic reactions,										•	63
Vaso-pareti	c,									26	
Enteric,										15	
Neural,										13	
Systemic,										5	
Dermal,										4	
Patients, .			·				•				125

In treating a large number of cases as intensively as has been the custom with our cases, it is to be expected that we have a great number of toxic reactions, but very few have been of a serious nature. From a close study in the last six months we have been able to classify the following types:—

Vaso-paretic, which includes the so-called common nitritoid, vertigo, immediate nausea and vomiting, fainting and palpitation.

Enteric or gastrointestinal, which includes late nausea and vomiting beginning after twelve hours and lasting for a day or more, the icteric and the diarrheal.

Neural reactions include headache, spinal crises and neuritic pains.

Dermal, which may be urticarial or in the form of a simple dermatitis, a burning sensation, and the deposit of pigment, the latter chronic.

Systemic, characterized by chills, fever, general malaise.

The most common so-called nitritoid reaction is rarely serious, although alarming and distressing to the patient.

Various methods of combating these reactions have given little or no success. The injection of adrenalin has been tried and discarded. The method of producing an anti-anaphylaxis,

described by Stokes, works remarkably well in some cases; in others it seems to fail entirely. He recommends the injection of a small amount, say .05 grams of arsphenamine from thirty to sixty minutes prior to the treatment. This produces a state of anti-anaphylaxis which lasts for two to three weeks, when it is necessary to repeat the operation. In cases in which it is possible to produce such an anti-anaphylaxis, all unpleasant reactive symptoms are entirely eliminated, and the patient is able to tolerate a large dose without ill effects.

A peculiar reaction occurred in one case of epileptic neurosyphilis in a patient who had received a great deal of treatment. He had a dermal reaction which consisted of a dermatitis with marked itching, burning, erythema and later scaling; thereafter treatment had been temporarily suspended. When the injections were resumed he appeared to be free from any reaction. However, fifteen to twenty minutes after an intravenous treatment he was suddenly seized with most intense and excruciating pain focused in one point, the center of the spine in the lumbar region. The patient was conscious, ground his teeth, perspired profusely and showed extreme engorgement of the blood vessels of the head and neck, the result of holding his breath and gripping with all his torose vigor. This lasted from two to three minutes and then subsided for thirty seconds, during which time the patient was free from pain. A recurrence of the same excruciating pain lasted again for two or three minutes, during which time the patient pressed his fist forcibly against the spot in the lumbar spine and cried out with pain. cycle recurred four or five times and gradually subsided. week later there was a similar reaction of the same intense pain in which the patient broke off a healthy tooth during an exacerbation. It has not occurred since. There was no similarity between these reactions and his customary epileptic convulsions.

The rational treatment of reactions lies in the prevention. This is best accomplished by giving therapeutic rests as stated above, just before the development of an intolerance.

RESULTS OF TREATMENT.

In a comparative study of the laboratory changes in a limited number of clinically *improved cases* (28) in which we were able to get complete before-and-after tests of sera and spinal fluids, we found the following:—

Table 6.* — Improved Cases.

A. Improved as to Wassermann reaction on blood and	
fluid and gold sol,	9 or 32 per cent
B. Improved as to Wassermann reaction on blood	
only, additional,	5 or 18 per cent
A and B. Improved as to Wassermann reaction on	
blood,	14 or 50 per cent
C. Improved as to gold sol only,	3 or 11 per cent
D. Improved as to Wassermann reaction on cerebro-	
spinal fluid and gold sol,	1 or 4 per cent
E. Stationary as to Wassermann reaction on serum	
and gold sol,	9 or 32 per cent
F. Worse as to Wassermann reaction on serum and	
fluid and gold sol,	1 or 4 per cent

Under A (Table 6) are represented 9 cases, — 7 of these had positive reaction on serum and spinal fluid and a more or less typical paretic curve; the other 2 had negative Wassermann reactions on the serum but were otherwise the same. All 9 cases showed great improvement after intensive treatment extending over a period of from three months to four years.

Under B (Table 6), there are 5 additional cases in which the blood serum became negative, the spinal fluid remaining unchanged. Thus including the cases under A and B, we have 14 improved cases or 50 per cent in which the Wassermann reaction of the serum became negative.

Under C there are 3 cases, or 11 per cent, in which the gold sol only showed improvement, the Wassermann reaction remaining unchanged.

Under D we have 1 case in which the spinal fluid was improved as to Wassermann reaction and gold sol only. The Wassermann in this case changed from positive to doubtful but the gold sol reaction became negative (Case No. 19, Table 7).

Under E there are 9 cases, or 32 per cent, which remained stationary as to all three tests.

Under F there is 1 case in which though there was clinical improvement, the serology including the Wassermann tests on the serum, fluid and the gold sol all grew slightly worse (Case No. 13, Table 7).

^{*} Table 7 gives a detailed account of the cases represented in Table 6.

Table 7. — Clinically Improved Cases.

					Ber	ORE TREA	TMENT.	AFTER TREATMENT.					
	Nu	MBER	·•		WASSERM	IANN RE-	Gold Sol.	WASSERM ACT	IANN RE-	Gold Sol.			
					Serum.	Fluid.	Gold Sol.	Serum.	Fluid.	Gold Sol.			
1, .					+ 1	+	55333,32000	±	_	00000,00000			
2, .					+	+	55553,31000	_	_	00000,00000			
3, .					+	+	55555,53100	_	+	44443,21000			
4, .					+	+	55555,54431	+	+	55555,52100			
5, .					+	+	55555,43331	- +	+	35555,13000			
6, .					+	+	55555,55310	_	-	00000,00000			
7, .					+	+	55554,43210	_	+	00111,00000			
8, .					+	+	00013,32110	_	土	12223,33300			
9, .					+	+	45444,21000	_	土	10000,00000			
10, .					+	+	01210,00000	_	+	00022,20000			
11, .					+	+	54433,21000	+	+	12223,33100			
12, .						+	00123,43100	_	_	00111,00000			
13, .					_	土	02222,21000	土	+	55555,51000			
14, .		٠			_	+	55554,33100	_	土	00000,00000			
15, .					+	+	55433,21000	+	+	55544,20000			
16, .					+	+	44444,33310	+	+	00000,00000			
17, .					+	+	55554,32110	+	+	55555,53320			
18, .					+	+	55544,30000	+	+	23355,44300			
19, .					+	+	12344,44300	+	土	00001,00000			
20, .					+	+	55544,22222	+	+	44333,20000			
21, .				•	+	+	44433,32100	_	_	00221,00000			
22, .					+	+	55544,43311	+	+	11133,32000			
23, .					+	+	55554,43211	_	+	55541,10000			
24, .					+	+	55555,44320	+	+	53555,54433			
25, .					+	_	12320,00000	+	-	00000,00000			
26, .					+	+	Paretic	_	土	Negative			
27, .					+	+	55554,43100	+	+	55554,43332			
28, .					+	+	11333,10000	-	-	00000,00000			

Table 8. — Comparative Serology and Fluid Findings, Twenty-seven Fatal Cases.

Α.	Distinctly	improv	red as	s to Was	serm	ann r	eact	ion (n				
	fluid and	d gold s	sol,		•				•	1 (\mathbf{r}	3 per	cent
В.	Improved	as to	Was	sermann	reac	tion	on	seru	m				
	and fluid	l, .			•					2 (r	7 per	cent
C.	Improved	as to	Was	ssermann	rea	ction	on	flu	id				
	only, .									2 (or	7 per	cent
D.	Improved	as to	Wass	sermann	reac	tion	on	seru	m				
	only, .									2 (\mathbf{r}	7 per	cent
E.	Improved	as to g	old s	ol only,				•		4 (or 1	5 per	cent
F.	Stationary									15	or 5	6 per	cent
G.	Worse. W	Vassern	nann	reaction	and	gold	sol,			1	or	3 per	cent

A study of Table 8, which was made from 27 cases with complete data taken before treatment and again shortly before death, shows that 56 per cent of the cases were practically unaffected by the treatment.*

One case (A) showed distinct improvement as to Wassermann reaction on fluid and the gold sol, but the Wassermann reaction on the serum remained positive.

Two cases (B) showed improvement as regards Wassermann reaction on both serum and fluid: in 1 case two doubtfuls changing to two negatives (serum and cerebrospinal fluid); the others, both positive at first, changing to both negative with a slight improvement in the gold sol.

Under C are 2 cases which showed improvement in the Wassermann reaction on the fluid only and D on the serum only.

Distinct improvement in the gold sol curve without reaction in the Wassermann test occurred in 4 cases, 15 per cent. One of these cases showed a practically negative gold sol with a terminal marked tabetic involvement during the last four months.

F represents by far the largest group, 15 cases, or 56 per cent, in which there were no changes in serology or fluid findings from the time of the first examination until death.

One case (G) in which at first the Wassermann reaction on the blood was \pm , all other reactions positive for paresis, grew worse until after treatment and at remission the blood serum also became straight positive before death.

According to this analysis of fatal cases in which minute care was taken to observe all laboratory and clinical changes, includ-

^{*} Treatment was combined, — salvarsan and mercury, — intensively given over periods of time varying from three months to two years; mostly averaging from six to twelve months.

ing, also, besides the Wassermann tests and gold sol reaction the cell count, albumin and globulin estimation, — the latter not given in these tables because they were not considered as vitally affecting the argument and because leaving them out of consideration simplified the matter greatly, — we find that over 56 per cent of the cases in which the diagnosis of neurosyphilis (especially the paretic type) is crystal clear both from a clinical and laboratory standpoint may be expected to terminate distinctly unfavorably. With exceptions, little or nothing can be hoped for from treatment as we know it to-day in these fully developed "committed type" cases.

Conclusions.

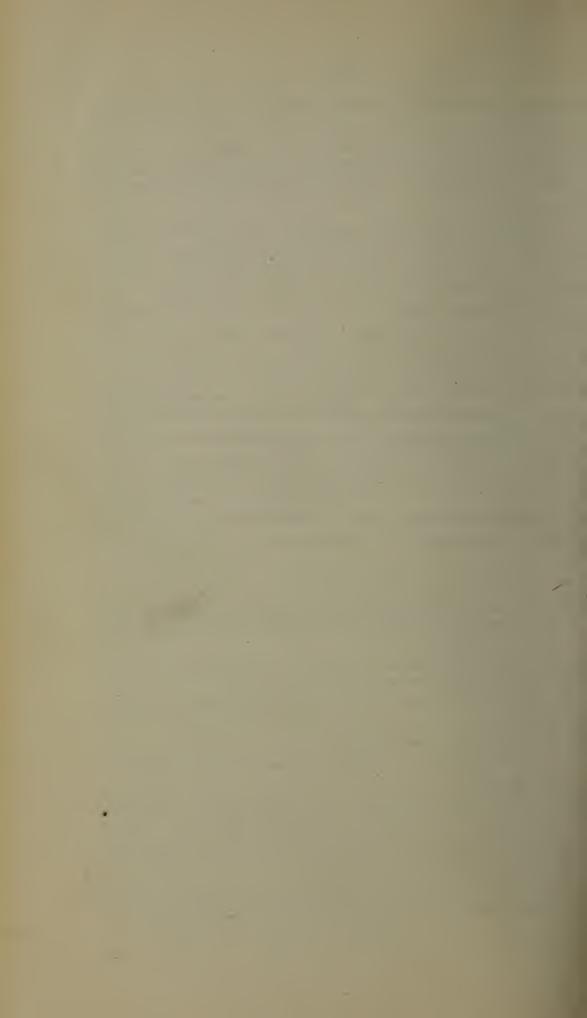
- 1. In 428 cases of neurosyphilis treated during a period of four years, 129 cases, or practically 30 per cent, showed definite benefit; 125 cases are under treatment in hospitals, of which a certain percentage can be expected to show similar improvement. Among 93 cases that have drifted away, another definite proportion, probably a larger number comparatively, can be presumed to have benefited from treatment.
- 2. There are two definite groups of cases of neurosyphilis: the early, or "psychopathic hospital" group, and the advanced committable, or "custodial group." The early case of the "psychopathic hospital" type is not met with in insane hospitals except in such as conduct out-patient departments. These cases also frequently first come to professional attention through the field of general or "internal" medicine.
- 3. The relatives (spouses, parents, offspring) of syphilitics and neurosyphilitics form a most important group in which not only syphilis but the earliest degrees of neurosyphilis, in the presymptomatic, often entirely unsuspected, stages, are brought to light by lumbar puncture and sero-analysis. It is in these types that by far the most benefit can be expected.
- 4. Early diagnosis preferable before pronounced mental symptoms have appeared gives the greatest promise of successful results. For it seems that for some reason, probably of a physiologico-chemical character, the curative agent is less able or practically unable to influence certain bacterial toxins after they have had time to combine with the neuroplasm. Another instance of this phenomenon is shown in the case of the tetanus toxin.
- 5. Apparently advanced neurosyphilis is not a contra-indication to treatment there is a distinct, though not large, per-

centage of such cases that amply gratify the efforts of intensive attack.

- 6. In early and atypical cases the most exhaustive, and often repeated, serological and spinal fluid examinations are the best guides to the diagnosis. The provocative method should not be overlooked.
- 7. Intensive and prolonged treatment to the point of saturation with the combined force of the three specifics, arsenic, mercury and potassium iodide. Arsphenamine has been preferred to neoarsphenamine as more lasting in its effects.
- 8. The therapia præsens of neurosyphilis is but a transition state in rational syphilotherapy. Medical science has discovered several good clues which must be followed up, and others ferreted out and run down, before the solution of the problem is complete. Indeed, the successful treatment of paresis and tabes as well as general vascular syphilis and visceral tertiaries, such as the crippling cradiopathia, etc., may ultimately be realized in the field of preventive medicine. With chemotherapy, however, Ehrlich has doubtless found the most vulnerable approach to the treponemiatic diseases, but further research is necessary, and other combinations must be found before the life of this anthropophagous pest is successfully snuffed out.

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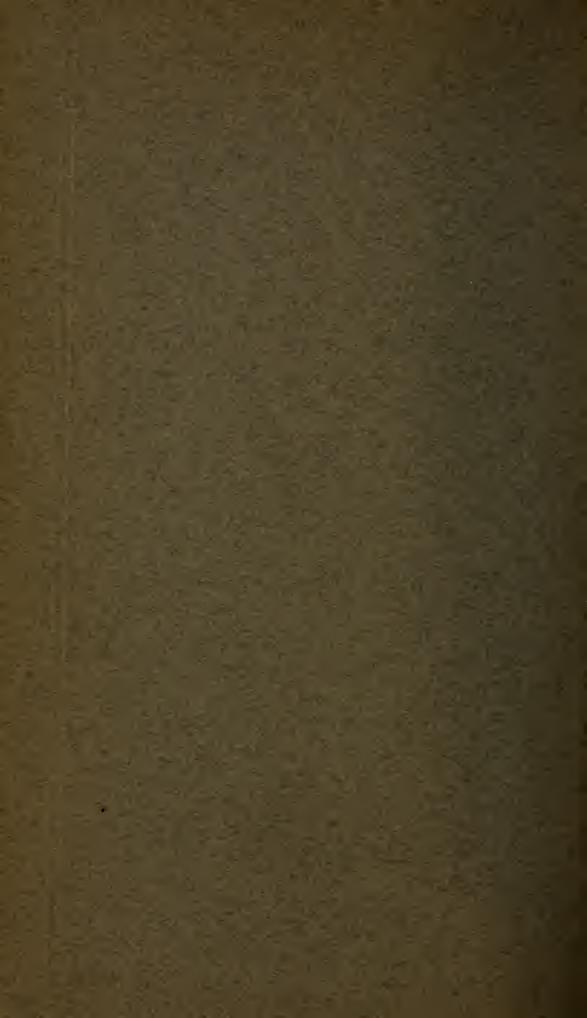
OF THE

MASSACHUSETTS DEPARTMENT OF MENTAL DISEASES

(PUBLISHED QUARTERLY)

PART BULLARD PROFESSORSHIP OF NEUROPATHOLOGY AT
HARVARD UNIVERSITY

OCTOBER, 1920



BULLETIN

OF THE

MASSACHUSETTS DEPARTMENT OF MENTAL DISEASES

(PUBLISHED QUARTERLY)

Papers in Honor of Dr. E. E. Southard's Decennial Anniversary of the Bullard Professorship of Neuropathology at Harvard University

EDITED UNDER THE PROVISIONS OF ACTS OF 1909, CHAPTER 504, SECTION 6, BY

WALTER E. FERNALD, M.D. GEORGE M. KLINE, M.D.

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SELECTED MEDICAL AND SCIENTIFIC STUDIES.

INTRODUCTION.

BY WILLIAM N. BULLARD, M.D.

It is only very recently that the importance of the study of neuropathology has been at all realized even in the most advanced medical schools of the United States. Up to the beginning of the present century nearly all work of a neuropathological character was done either by physicians who were not specially devoted to pathology, or by general pathologists, very few of whom had any real interest in the study of neuropathological specimens, or cared to devote the time to work in this direction or to learn the difficult and tedious technique required before their results could be of real value.

In the latter part of the last century it was difficult and often impossible to obtain the information desired by the progressive clinician in regard to rare and valuable specimens, and too often the practitioner was informed that a brain or spinal cord appeared "normal" when he knew that his patient had suffered long and severely from symptoms derivable from an affection of these organs. These conditions were not only extremely trying and discouraging to the active practitioner who was desirous to know the pathological conditions of the diseases or affections he was devoting his life to treating, but they also discouraged many men from entering into the study of neurology. It took away from the psychiatrists and the superintendents of the hospitals for the insane and of the sanitaria for those afflicted with mental trouble the stimulus to make themselves, or cause to have made, pathological investigations which would throw light on their problems. Thus many of the superintendents were discouraged from any efforts in this direction, and for this cause among others were driven to devote themselves to administrative rather than to therapeutic or clinical problems.

Hence it seemed very important that some effort should be made to afford to the practitioners of medicine in New England

and elsewhere a definite knowledge of the conditions of the nervous system in their patients, and to study and investigate in general the special pathology of the nervous system, — the brain and the spinal cord and their envelopes and the ganglia and peripheral nerves.

In 1906 the Foundation for a Professorship in Neuropathology was established in the Harvard Medical School by Louisa Norton Bullard in memory of her husband, William Story Bullard of Boston, merchant, and for many years trustee of the McLean Asylum, now known as the McLean Hospital, and situated at Waverley, Mass.

The letter establishing this professorship and accepted by the university was (in part) as follows:—

MARCH 2, 1906.

BULLARD PROFESSORSHIP OF NEUROPATHOLOGY.

This professorship shall embrace study, research, investigation and teaching in relation to disease of the nervous system whether functional or organic, and shall include not only the affections ordinarily classed under neurology, but all mental diseases and disturbances, both those classed under psychiatry and any others that may exist. The methods and detail of work under this professorship are not restricted. It should include any form of research and investigation which may lead to the increase of knowledge of nervous or mental disease. It comprises the comparative study of these diseases in animals and other living forms.

Since the establishment of this professorship, Dr. Southard has been the only chief, first as instructor, then as assistant professor, and finally as full professor, which he was made in 1909. He was one of the last professorial appointments made during the presidency of Mr. Eliot, and was, at the time he became professor, the youngest professor in the Harvard Medical School.

The whole duty of organizing and administering this Department has since the beginning fallen upon him.

What advances have been made in our knowledge through this Department, and what benefits have accrued to medicine, I shall leave to others to declare.

I cannot leave this subject without expressing the debt that this Department owes to Professor Councilman, professor of pathology, for his constant assistance, advice and interest in all matters concerning its establishment and welfare, and the unselfishness and broad-mindedness shown by him in all relations between this Department and his own.

SUGGESTED LINES OF ADVANCE IN SOLVING THE TYPHOID PROBLEM.

BY FREDERICK P. GAY, M.D.

In a forthcoming monograph the writer has endeavored to trace the development of our scientific knowledge concerning typhoid fever. Numerous treatises of large and small dimension have been written on this important human disease, most of them, however, from a purely clinical aspect, utilizing such scientific information derived from the laboratories as has been immediately of practical value in clinical diagnosis and therapy. On the other hand, various segments of the laboratory aspects of the typhoid problem, for the most part contributed since the discovery of the typhoid bacillus in 1882, have appeared, not only in original articles, but in treatises in connection with textbooks on bacteriology and immunology.

A critical study of the history of the study of the typhoid problem from the dual viewpoints of theory and practice leads to an appreciation of how much the development of the laboratory sciences has meant in clinical medicine. All that we know concerning the exact etiology, and much of our effective knowledge in the epidemiology and modes, of sanitary prevention of typhoid fever rests directly on the discoveries which concern the typhoid bacillus. The only absolute methods of diagnosis depend either on the demonstration of the typhoid bacillus in the body of the patient or on the demonstration of reaction products on the part of the patient to this micro-organism. The prevention of the disease, again, in a specific manner by means of vaccination, of course, presupposes the isolation of pure cultures of the causative agent. Specific therapy in the larger sense of effective or definite therapy would again seem to have depended on recent advances that have been made through discoveries originating in the laboratories.

No human disease offers greater promise of eventual complete disappearance than does typhoid fever, and this disappearance is taking place through the application of the knowledge which we are so rapidly gaining as to the mechanism of this disease, or, more important, as to the life cycle of its parasitic agent within and without the body.

Typhoid fever has disappeared in armies where it was formerly the greatest menace, owing to the extremely suitable age and unusual exposure of those who comprised such aggregations. This disappearance has been due to some extent to improved safeguarding of water supplies, but in great measure to the introduction, first, of voluntary, and later of compulsory, vaccination. The disappearance of typhoid fever, or at least its great diminution in the recent European war, has led to an appreciation of the importance of its hitherto subordinate cogeners, the paratyphoid fevers, and they in turn are yielding to the same type of specific vaccination, as they have been recognized through bacteriological examinations without which their identity would have remained unsuspected. In general communities typhoid fever is still a disease of some importance, more particularly in the country than in the city, where better methods of safeguarding water supplies prevail. Vaccination is by no means a common or recognized procedure as it is in the case of smallpox among the general populations. Of the sources of origin of secondary typhoid cases from original cases of the diseases, the more important are now fully recognized. The typhoid patient himself is no longer a menace under modern supervision. excreta are properly disposed of and cease to give rise to further cases of the disease. The carrier alone, whether healthy or recovered, remains the most important and still frequently the unexpected source of the disease.

The important lines of advance, in addition to those already undertaken and pursuing their fated course, would, it seems to us, be a special emphasis and recognition of the following factors. First, early diagnosis of every case of typhoid fever, in order that each source of infection may be checked as soon as possible, and in order that the treatment of the patient himself may be as intelligently carried out as may be. This early diagnosis of each case could be brought about by affording the reluctant general practitioner an easy method of obtaining the results from blood cultures. It is suggested that this could be brought about, at least in the larger communities, by an extension of the district nurse system, which would allow a trained technician to take and to diagnose such cultures.

As a second means of combating typhoid fever, it is suggested that every case of the disease should be traced bacteriologically through convalescence to determine the existence of carriers. It is by no means the rule, even in the best hospitals, for successive stool examinations to be made before discharging a typhoid patient, and yet in no other way can the important group of recovered carriers be detected. There still remain a group of healthy carriers for which the determination of some method of diagnosis more readily available than stool culture is highly desirable. The suggestion is made that the typhoidin skin test should at least be experimented with in this connection.

Most important, perhaps, of all the future advances in respect to typhoid fever will lie in the means of curing carriers once they have been detected. It would seem that certain lines of investigation of a chemotherapeutic nature might be of avail in this connection, particularly in view of the fact that in the rabbit carrier we have an almost perfect analogue to the human condition, which affords at once a ready method of testing the possibilities of any given type of therapy.

Further theoretical studies are desirable to determine the exact nature of the immunity which is afforded by prophylactic typhoid vaccination. This vaccination, although fairly efficient in the majority of individuals for several months, perhaps for as long as two years, fails entirely in certain individuals, and after considerable periods of time in all, to protect against the dis-At all events, it affords by no means so sure a protection as does recovery from the disease. It would be highly desirable to determine the differences in immunity between the two types of protection afforded by recovery on the one hand, and by vaccination on the other. That they are different is suggested by the fact that serum reactions are the rule in the second and less marked type of protection, and are absent, for the most part, in recovered cases after a short interval. The question is open as to whether some new type of vaccine or some modification in the method of administering it would lead to a more enduring immunity than the present methods in vogue. Further testing of the typhoidin test as a means of indicating protection in the individual case is strongly urged.

The intravenous injections of small amounts of typhoid vaccine, or, indeed, of any foreign protein, gives rise to a train of symptoms of a critical nature which is frequently of advantage in aborting or cutting short the course of typhoid fever. The exact mechanism of this beneficial reaction is by no means understood. It comprises an increase in the number of leucocytes, and its results would to some extent seem dependent on the potency of the antibodies in the patient at the time of injection. Whether the result is due to the upsetting of a ferment, — antiferment balance and liberation of the ferment or mobilization of the ferment, thereby destroying the typhoid bacillus in certain parts of the body, — is an open question worthy of further consideration.

A MEDICAL SERVICE WITH THE BRITISH EXPE-DITIONARY FORCES IN FRANCE.*

BY ERNEST T. F. RICHARDS, M.D., St. PAUL, MINNESOTA.

With American troops pouring into France, and American doctors closely following to care for those incapacitated through injury or disease, this is an appropriate time for us to consider some of the problems which our medical colleagues already over there, as well as those who expect shortly to go, will have to meet.

Military medicine differs greatly from civilian, and when one enters an enormous military hospital, such as those now found so numerous in the war zone, one is at once impressed with the fact that he confronts an entirely new realm in medicine. This is probably true of both surgery and medicine, but in medicine in particular one meets with problems dealing not only with totally new clinical syndromes, but with the greater ones of their undiscovered etiology and unguided therapy. It then becomes a matter of learning quickly from first-hand experience how to grapple with such interesting problems as trench fever, gas poisoning, epidemic jaundice, trench feet, shell shock and many others.

This truth — that the gulf between civil and military medicine is vast — was impressed upon me during the winter of 1915 and 1916, when, as the officer in charge of the medical division of a military hospital in France, I welcomed the opportunity to study first-hand in the British Army Medical Service the same problems that the American Army Medical Service is now meeting.

TRENCH FEVER.

Our hospital formed one of a chain of those attached to the British Expeditionary Forces, and was kept filled during that winter with the sick and wounded from the Northern Sector of the British line. One of the most important conditions we met was trench fever. You are all now familiar with the term. Its great importance in military medicine of to-day can not be overestimated. It forms as pressing a problem now as any en-

^{*} Presented before the annual meeting of the Minnesota State Medical Association, Duluth, Aug. 28 to 30, 1918. Reprinted from Minnesota Medicine, February, 1919.

countered in the war zone as, although of itself non-fatal, the morbidity resulting from it on the western front probably exceeds that from any other disease. Those affected with it are in many instances permanently unable to resume their former duties, and some pass back into civil life incapacitated and a charge on the State. The importance of the disease is also emphasized by the fact that in its later stages it is a direct cause of a large percentage of the "irritable heart" of the soldier, of neurasthenia, myalgia, and of so-called "chronic rheumatism" in many of its manifestations. You see, therefore, at a glance how great the need is of most careful study of this condition.

Definition.

Trench fever is now known to be a blood infection communicable from man to man by the louse and possibly other parasites. It may best be defined as a relapsing fever occurring with great frequency among troops on active service, and presenting a uniform group of symptoms which conform with no previously described condition.

Etiology.

Although we now know trench fever is conveyed by lice, the causative organism of the disease yet remains to be discovered. While we were in France every case of fever that came into our wards — and they came in large numbers — was carefully investigated first from the standpoint of etiology. Fortunately our hospital was equipped with an excellent laboratory, so that it was possible to carry out very complete bacteriological studies on all cases. One or two only of the entire number proved to be paratyphoid fever, while not a single case of true typhoid was seen. This is a glowing tribute to the protection afforded by the anti-typhoid and anti-paratyphoid inoculations which every individual — soldiers, nurses, doctors, etc. — is compelled to receive before entering the war zone. So, also, no case of acute rheumatic fever occurred in our entire series - striking evidence against any relationship between this disease and exposure, as practically all of our cases came directly from the trenches where they had been subjected to the most rigorous and changeable climatic conditions. Another interesting fact was that under such conditions acute follicular tonsillitis was extremely rare. True influenza was never proved to occur insomuch as catarrhal symptoms of the upper respiratory tract were

rare, and also careful examinations of sputum and blood cultures were invariably negative for the influenza bacillus.

In those cases of pyrexia clinically diagnosed as trench fever our bacteriological studies, like those of others, were uniformly negative. Such studies included blood cultures, cultures from stools and urine, careful search of fresh and stained blood films, and cultures from muscles and the subperiosteal areas of the long bones.

Though the etiological factor, therefore, in trench fever is yet a matter for speculation, the infectivity of the disease has been proved by Captain McNee of the British Army Medical Corps through its ready transmission from one person to another by means of the blood. This investigator, using healthy soldiers who volunteered for the experiments, found that the disease is transmissible in every case by the whole blood, whether injected intravenously or intramuscularly. He found that blood corpuscles after being washed several times in salt solution to remove the plasma were still infective. Blood corpuscles were broken down and the hemoglobin-tinted fluid passed through a filter in an attempt to prove the virus an ultra-microscopic one confined to the corpuscles. The fluid when injected, however, was not found to be infective.

The report of the British Trench Fever Commission, published last month, has corroborated these findings of McNee's, and has also added further important experimental data. Among these are: That the excreta of infected lice when applied to a broken surface of skin readily produce trench fever; that the bites alone of infected lice do not bring about the disease; that the bodies of infected lice when crushed on the broken skin are capable of producing trench fever; and that the infection is not a disease of normal lice, but, in other words, infection can only be conveyed by lice that have fed upon an individual already infected with the disease.

Clinical Course.

The onset is usually sudden and sometimes is exceedingly abrupt. The patient may suddenly feel giddy with a burning head, he shivers, and may be very short of breath. In such cases of abrupt onset the soldier may have to fall out, if on parade or marching, and often has great difficulty in returning to camp without assistance. He complains of severe headache,

especially frontal and behind the eyes. This is rapidly followed by pain in the lower part of the back, and, on the second or third day, in the legs. With this pain in the legs there is often tenderness on pressure over the shins. The tenderness is most marked over the lower half of the shins, and may be very severe, comparatively little pressure causing the patient to cry out with the pain thus produced. A less degree of tenderness is often present in the calf muscles. The patient generally shivers, but there is never a definite rigor. He is occasionally flushed and often sweats profusely. The appetite is lost. Leucocytosis averaging from 10,000 to 15,000 may be present during the attack. There is no rash.

Depending upon the duration and type of trench fever two clinical forms are recognized: (a) the short, and (b) the long. In the short form the temperature rises rapidly to between 102 and 104° F. On the third or fourth day the temperature suddenly falls to normal or subnormal, but there is no corresponding improvement in the symptoms. After an interval of a few hours the fever again rises, and then after another two to five days it returns to normal. On this occasion there is immediate relief of all symptoms, and the patient is fit for duty almost at once.

In the long or periodic type, which is the typical relapsing form, the temperature rises to between 101 and 104° on the day of onset. With the fever there are the typical symptoms: frontal headache, conjunctival congestion, shivering, sweating, pain in the lumbar region and in the shins, with tenderness of the shins and calf muscles. After a period varying in length from twenty-four hours to five days the fever drops and all the symptoms disappear. The patient may then be thought to be well and sent back to duty, but after a period of usually five to eight days the fever and other symptoms, especially the pains in the shin, reappear. On this second occasion the febrile period usually lasts about forty-eight hours. It is followed again by a remission and subsequent relapses, or there may be a period of unstable temperature. Eventually a certain percentage of the patients pass into a stage of chronic ill health, suffering from recurrent pains in the limbs, headaches, nervous manifestations such as mental depression, excessive tendency to sweating, disordered action of the heart and abnormal responses to stimuli. The infection, in some cases, is very persistent, and acute febrile relapses may occur after months of quiescence.

Prognosis.

About 90 per cent of trench fever cases yield to symptomatic treatment, and are able to return to duty in four to six weeks. In the remaining 10 per cent the disease pursues a more obstinate course, and may show febrile relapses after periods of several months, or there may be permanent ill health as a result of myocardial irritability, recurring myalgias or nervous exhaustion.

Prophylaxis.

The prophylaxis of trench fever rests upon the extermination of lice. This, under the conditions of modern warfare, is a very difficult problem. To render the men themselves louse-free, the chief measures consist of shaving the hairy parts of the body, hot tubs, and smearing the underclothing with a louse-destroying grease. It might seem that it is not always convenient in trench life to carry out such procedures. However, it is very surprising how quickly the systematic parading of troops from their billets or dugouts, and their thorough disinfestation, has become a part of the modern military régime. The best louse-destroying grease has been the subject of innumerable investigations. At present the most satisfactory grease for application to the underclothing is composed of crude naphthalene, 4 parts, and soft soap, 1 part (Bacot and Copeman).

Clothing, blankets and kits are best disinfected by heat. Dry heat is preferable, as clothing may then be worn immediately after treatment. A temperature of 55° C. for thirty minutes, or 60° for fifteen minutes, is necessary to kill lice and their eggs with certainty. Such temperatures, however, will not disinfect the excreta of lice. The necessary temperatures for this purpose have not yet been determined (Byam et al.).

To rid billets, dugouts and huts of lice they are fumigated. The best gases to use for this purpose are sulphur dioxide or hydrocyanic acid gas. The latter is dangerous except in buildings which can be readily ventilated, but it is the more certain of the two (Byam et al.).

Finally, in the prophylaxis of trench fever, as in the case of other infections, there figures the problem of carriers. This matter is at present a subject of most careful investigation by the British sanitary authorities. With the disease subject to relapses over indefinite periods of time, the carrier problem is necessarily proving a difficult one to control.

Treatment.

Therapeutic efforts have so far proved unavailing in shortening or modifying to any appreciable degree the course of trench fever. Rest, provided it is begun early enough, followed later with moderate exercise and thyroid therapy, has in the hands of some apparently lowered the subsequent incidence of disordered action of the heart.

The salicylates will in some cases relieve the intense shin pains, but many require morphine. Salvarsan and quinine have proved useless. The sera of convalescent patients have been injected intravenously without influencing the course of the illness.

Of the numerous local applications used for the painful shins, cold compresses of saturated magnesium sulphate solution, first recommended by Capt. D. S. Harvey of the R. A. M. C., seemed in our series to give some relief.

GAS POISONING.

Turning from this brief sketch of trench fever, let us glance for a moment at what is perhaps the most tragic condition the medical officer in France has to combat, — gas poisoning.

There have been innumerable gases employed in this war. As soon as an antidote is found for one a new gas is invented.

Carbon Monoxide Gas.

Explosives forming CO gas in large quantities when suddenly dissociated are very common in modern warfare. No harm is done by the liberation of this gas in the open air, but in dugouts, caves, mine galleries or deep mine craters, severe and even fatal cases of poisoning occur. The same blood changes, symptoms and treatment apply in these cases as in CO poisoning in civil life.

Drift Gas.

During the winter we spent in France chlorine was the most popular drift gas with the enemy, and "gassed" cases were numerous on our service; during the course of a single night, for example, over 100 victims of this appalling method of warfare were admitted to the medical wards. Chlorine formed an excellent drift gas as, (1) a 1 to 10,000 concentration rapidly puts a man out of action by asphyxiating him, owing to its intense irri-

tative property; (2) it is much heavier than air; (3) it is manufactured in huge quantities in trade processes; (4) it is easily compressible into cylinders for convenience of transport and handling. Moreover, a respirator is easily contrivable to protect the person who manipulates the brigade gas attack, and it is obvious that no drift gas can be used offensively from which the users are unprotected.

Pathology.

The pathological findings in individuals dead of gas poisoning may be summed up as follows: most intense congestion with hemorrhages, edema, and emphysema of the lungs; dilation of the right heart; submucosal hemorrhages of the stomach; and venous congestion of the brain due to the asphyxial character of the death.

Symptoms.

The extent to which an individual is affected by the poisonous fumes differs greatly, and depends largely upon how securely he is able to protect himself with his gas helmet at the time of the attack. The use of these helmets has cut down the mortality rate from gas attacks wonderfully. Both the British and French soldiers place great faith in them as a means of protection, and many of them told us that if they had had their helmets on in time, or if the masks had not been torn, they would have escaped poisoning entirely. In those most seriously affected the picture of suffering presented almost beggars description. The main clinical symptoms may be classified as follows:—

Cyanosis.
Dyspnea.
Cough with profuse expectoration.
Pain in the chest.
Irritation of the throat.
Salivation.

Conjunctivitis.
Stupor.
Headache.
Epigastric pain.
Nausea and vomiting.
Fever.

Physical Findings.

The chief physical findings are, of course, in the lungs. Difficult rapid respiration and pain upon breathing are prominent. Over both lungs, and most marked over the lower lobes, there is impaired resonance ranging from slight to well-marked dullness. Throughout the chest, frequently obscuring the heart tones, harshened breath sounds accompanied by râles of every

known variety are the prominent findings upon auscultation. Especially notable is the coarse, bubbling type of râle situated at the lung bases. In about 2 per cent of our cases bronchopneumonic patches of consolidation appeared at the end of the first week of illness. In one case of the series a large serous exudate occurred in the pleural cavity in the fourth week.

Feeble heart tones, increased pulse rates, low blood pressures, and occasional definite myocardial dilations are the chief circulatory phenomena.

Other physical findings are: evidences of laryngeal irritation; cyanosis; heavily coated tongue, often of a greenish yellow color; foul breath; tenderness in the upper abdomen, being in some patients very marked; and, depending upon the depth of the stupor, diminished pupillary, skin and deep reflexes.

Course of Illness.

In the majority of our cases, even in those classified as mild, both physical signs and symptoms were very slow in clearing up. This was especially true of the cyanosis, which showed great tardiness in disappearing and a marked tendency to return upon slight exertion, such as sitting up in bed, even when all other evidences of poisoning had gone.

Dizziness was another obstinate symptom, and often while not present while lying in bed was frequently very troublesome during convalescence when attempts were being made to get the patient up and around. In several cases, owing to the dizziness, confinement to bed was necessary during the entire stay in the hospital, which extended sometimes to five and six weeks, after which, if not sufficiently well to be transferred to a convalescent camp, the patients were sent to England by hospital ship.

Cough and expectoration were also slow in improving, and persisted in many cases well into convalescence.

Fever of slight or moderate degree lasted in the most severely ill throughout their entire stay in hospital.

Convalescence, even in mild cases, was slow, and attended with considerable muscular and nervous exhaustion. Several patients, after a five weeks' stay in bed, had to be shipped on stretchers to England to convalesce. Recurrence of cyanosis and dizziness on exertion, coupled with a low blood pressure, an accelerated pulse and anemia, frequently made their further convalescence exceedingly tedious.

Treatment.

The treatment adopted by us for this distressing condition consisted of —

Enforced rest in bed.
Fresh air.
Forced nourishment.
Expectorants.

Oxygen inhalations.
Venesection.
Atropine sulphate.
Strychnine, digitalis and morphine.

It is somewhat problematical which of these measures were of the greatest moment, but with a large number of the cases desperately ill on admission, the total mortality rate under this régime was only 3.5 per cent.

Rest in bed with the maximum amount of fresh air, the patient being kept as warm as possible, and forcing of nourishment, were undoubtedly important factors in saving the lives of many.

Of the expectorants, ammonium carbonate used early helps to clear up the copious frothy sputum.

Inhalations of oxygen strikingly relieve the air hunger, the cyanosis and the distressing dyspnea. In those most seriously ill it was freely used at short intervals, the patients themselves frequently begging for it. When possible the patient should be kept in an atmosphere of pure oxygen until all alarming phenomena have disappeared, even if this requires a continuation of the oxygen supply for several days.

A most important measure is venesection. In those cases showing extreme cyanosis, greatly labored breathing or right heart dilation venesection was employed with very great benefit. It was followed in each instance by a distinct lessening of the cyanosis, diminution of the headache, and improvement in the other symptoms. From our observations it would appear that this measure, to be of most value, should be carried out early and repeated, if necessary, at rather frequent intervals, with the withdrawal of only moderate amounts of blood on each occasion.

Atropine sulphate, in large doses hypodermatically, was of definite value. Strychnine was of doubtful, but in a few instances of some apparent, value. Tonic doses of digitalis, after the acute stages of the poisoning had subsided, and particularly during convalescence, was distinctly beneficial.

SHELL GASES.

At the present writing drift gases have been largely replaced on the western front by shells containing chemicals in liquid form generating toxic gases in the presence of moisture. Dichlorethylsulphide, better known on account of its odor as mustard gas, has been extensively used by the Germans since they first employed it against the British troops in July, 1917. When such a shell strikes an object a special fuse explodes a chamber of picric acid, bursts the shell, and sprinkles the liquid over a large area.

Since November, 1917, a new chemical has been identified in German shells. This substance, commonly called arsine, is diphenylarsine-chloride. As found in the clothing of gassed men, it consists of fine solid particles having a strong garlicky odor (de Tarnowsky).

In both mustard gas and arsine the symptoms are: severe epigastric pain accompanied by repeated emesis; coryza of varying severity; conjunctivitis with profuse lacrimation, and, in some cases, photophobia; cutaneous symptoms, such as, erythema, severe itching, blisters and edema. After two to three days a painful laryngitis, often with aphonia, followed by severe bronchitis, develops.

The shell gases have been most successfully met by the British and French medical men, and the mortality rate has been very The most important means of protection are the gas masks provided with the proper antidotes (which obviously for military reasons cannot be discussed at this time). The general management of these gases is similar to that described for chlorine poi-Gastro-intestinal symptoms are fairly well controlled by the daily administration of 100 cubic centimeters of a 1 to 1,000 solution of saccharate of lime. For the eyes, sodium bicarbonate washes give relief. For the respiratory tract the application, by means of an atomizer, of a protective oily solution such as liquid albolene gives excellent results in the milder cases; for the severe cases intratracheal sprays are employed. For the skin lesions the British employ douches, bathing and wet dressings of sodium bicarbonate solutions; the French treat all their burns with a protective dressing of gutta-percha (6 to 10 per cent) and paraffin (90 to 94 per cent), made popular under the name of ambrine.

INFECTIOUS JAUNDICE.

Infectious jaundice, another important medical problem occurring among the troops in France, was of especial interest because of its striking similarity to the infectious jaundice seen in civil practice. The condition is substantially the same as that described in 1886 by Weil, and since known as Weil's disease. As is well known, widespread epidemics of this condition have been recorded in the United States. Its chief features are: jaundice, fever, hemorrhages, and the occurrence of cases in epidemics or localized groups. The Japanese worker, Inada, and his collaborators have established from a study of the disease appearing in Japan that the infection is caused by a spirochete, — the spirocheta ictero-hemorrhagica. The organism appears to gain access to the human individual through the alimentary canal, and possibly, also, through the skin. Lice have been considered as possible intermediate hosts, but the tendency now is to blame the field rat, as Inada and his coworkers have succeeded in finding the spirochetæ of jaundice in the kidneys and urine of 38 per cent of ordinary field rats in the infected areas in Japan.

That it is possible that other organisms, such as the *B. paratyphosus*, may be factors in the production of epidemic jaundice must be kept in mind, but it would appear that the great majority of cases of infectious jaundice met with in armies on campaign can be accepted as examples of Weil's disease.

The clinical course of the infection as we observed it in France was of a fairly uniform type. The onset may be abrupt with a chill; or more gradual with intense headache, dizziness, nausea, persistent vomiting, diarrhœa and abdominal pain. An irregular fever develops, and jaundice appears in forty-eight to seventy-two hours, at times of but slight degree, but gradually deepening in the severe cases. Hemorrhages into the skin and conjunctiva may take place. Bleeding from the nose, mouth, stomach or bowels may occur in the severely jaundiced cases. A decided albuminuria with numerous casts and red blood cells is a striking feature. In the severe cases the prostration is practically a collapse. The muscular soreness prevents movement. The legs may be swollen. Active delirium may be present. Drowsiness with slowness of the pulse is common. After three or four days, in a mild case, the fever gradually

drops, convalescence slowly begins, and the yellow color gradually fades. Slight or severe febrile relapses may occur, or a mild fever may continue for twelve to twenty days. In a fatal case the jaundice deepens, vomiting is marked, the temperature becomes subnormal, prostration is extreme, and the patient dies of exhaustion. Physically, jaundice of greater or less degree, with injection of the conjunctive, herpes, dry tongue, sordes, and late-appearing papular rashes in a severely prostrated patient, make the general picture of the disease. The abdomen is usually tender, and resistant if the pain is extreme. The liver and spleen are usually not enlarged.

The prognosis may be said to be favorable, even in the more severe cases. The death rate averages less than 6 per cent. The virulence of the disease as seen by us in France is much less than that described in Japan.

The treatment of infectious jaundice is at present purely symptomatic. Good nursing, unlimited fluids, fresh fruits, and the rectal administration of glucose (6 per cent solution, 1 pint) once or twice daily in cases with vomiting and acetonuria, are the main indications.

Many other conditions, as, for example, shell shock, trench feet and trench nephritis, make, together with those we have discussed, an active medical service in a military hospital a rich and treasured experience. But apart from this and the valued associations one makes, to the doctors who serve comes the greatest recompense of all, — the conviction that they form an absolutely essential and indispensable factor in winning the greatest war ever fought for the sake of humanity.

MOTION STUDY OF INOCULATING TUBES.*

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A standard method of inoculating culture tubes is presented with picture showing details of arranging and placing the apparatus and the movements of the operator in inoculating tubes.

The major portion of the writer's technical bacteriological practice was performed at the Danvers State Hospital Laboratory under the direction of E. E. Southard, who was then (1906 to 1909) pathologist to the hospital. During that time extensive bacteriological research was done in post-mortem bacteriology, 1,2,3,4, epidemic dysentery, endemic dysentery and diphtheria.

This method was gradually and unconsciously evolved from pressure of work: Technique will occur to any one performing the same operation over and over in which the muscles gain an automaticity and mechanically assist the operator by traversing their paths, leaving the mind free for emergency or supervision. and would probably have been as unconsciously forgotten had not a "scientific selection" of a place for a summer vacation been made as a result of hearing Mr. F. B. Gilbreth read his paper on "Motion Models as a Method of Education" before the section on education at the American Association for the Advancement of Science, in Columbus, 1915. Mr. Gilbreth invited the section to attend the summer school in Providence, and at this time (1916) micromotion studies of mechanical movements were made. An accurate study of the process here presented was pictured. Mr. Gilbreth commented favorably on the results.8 which showed an average time of twenty-four seconds.

APPARATUS.

With a clear flat space 28 by 16 inches, a Bunsen burner, gas connection, matches, tubes of mother culture, empty wire baskets, a platinum loop, a sharpened pencil, sterile tubes of culture media, a small block for slanting one basket, a table or

^{*} This is one of a series of fifteen papers (261, 1919.4) offered to Prof. E. E. Southard in honor of the decennium of the Bullard Professorship of Neuropathology, Harvard Medical School. Reprinted from the Boston Medical and Surgical Journal, Vol. CLXXXIII, No. 4, July 22, 1920, pp. 103-105.

desk at appropriate height with chair to accommodate the operator, one can rapidly reproduce the setting for this work.

By following the picture from left to right, the process and angle of holding tubes, the order of assembling, etc., are perfectly seen.

The gas burner, at full height of flame, is in the center directly in front of the operator, as are also the mother tubes in an ordinary glass tumbler. This differentiates them for all time, and prevents mixing them with the sterile culture tubes (on the right in baskets) and with the freshly inoculated tubes on the left (slanting basket).

Between the center and the culture tubes on the right is an empty wire basket on top of which rests the platinum wire loop, No. 20 gauge, fitted into a glass handle; this placing prevents it from rolling into the operator's lap or taking other excursions calculated to delay the proceedings, and it is near the height of the flame in which it is necessary to pause; also a pencil lies on the table in this sector, and a matchbox is at the base of the burner. To the left is a basket placed in a slanting manner with its opening toward the center of the semicircle of the field of operation.

THE CYCLE OF MOTION.

The cycle of motion consists in placing the mother tube in the left hand between the thumb and index finger, resting the free edge against the partly flexed second finger.

Next select a sterile tube with the right hand, to lie parallel to this tube; twists are rapidly made of cotton plugs to make sure that they are free from the sides and are of proper snugness. Then the right hand picks up the glass rod, "flames" it by holding it perpendicularly to the gas flame and in it until the wire has a dull red glow, then passes it horizontally through the flame twice to rapidly sterilize without breaking the glass connection.

The next step consists of moving the left hand holding the tubes to the palm of the right hand, the little finger of which closes over the cotton in the tubes and holds the plugs firmly against the palm of the hand, at which time the left hand is separated from the right hand and the plugs are left firmly held away from possible contamination in the palm of the right hand, the thumb and forefinger of which support the loop which is cooling, since a red-hot rod while sterile would cause great



Set-up showing position of apparatus on 4-inch blocked table, with slant of needle and tubes shown by 1-inch screen.



devastation of bacteria in the mother tube. The left hand approaches the open tubes to the flame, sterilizing their throats. The right hand holding the platinum loop seeks a safe space behind the flame as the left hand pulls back the tubes and the platinum loop moves into the throat of the mother tube and gently rakes up some of the bacteria which is on the surface of solid media or which is caught up from the fluid media, and with a slight turn of the left hand from the wrist, while the loop is withdrawn from the mother tube, the second tube is in position for the transfer of the culture, and the throat of the sterile tube is entered and the bacteria deposited in the medium.

The tubes are again flamed, the stoppers replaced by one movement of the right and left hand reversing the withdrawal of the cotton. The right hand sterilizes the loop and lays the rod down over the top of the wire basket, swooping to the top of the table to pick up the pencil with which to write on the label the pertinent facts, after which a new culture tube is placed in the slanting basket to the left and a fresh tube is selected to begin a new cycle.

ADVANTAGES OF THIS METHOD.

- 1. Semicircular setting of apparatus conducive to greatest convenience.
 - 2. Bare forearms prevent tipping by coat sleeves or cuffs.
- 3. Elevation of platinum loop prevents its becoming misplaced, and gives easy grasp.
- 4. Pulling two cotton plugs by one movement and replacing by one movement made possible by uniform distance between the tubes.

WHAT STUDYING A METHOD BY MICROMOTION TEACHES THE OPERATOR.

- 1. Necessity for having apparatus well arranged.
- 2. Desirability of maintaining standard conditions.
- 3. Incentive to improvement in technique.
- 4. Confidence in method.

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ACUTE CHANGES OCCURRING IN THE CELLS OF THE SOLAR PLEXUS IN INTESTINAL CONDI-TIONS.*

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In some previous papers I described chronic pathological changes taking place in the sympathetic nerve cells of the solar plexus of insane patients and described some acute changes as well. The following two cases in which acute intestinal conditions occurred were associated with acute changes of the nerve cells of the type described as acute Nissl degeneration. The relationship of the sympathetic nerve system to intestinal conditions has been very insufficiently studied, and, in part, this is the reason for presenting these two cases.

Case 1.— White woman, No. 16344, autopsy No. 152. Entered the hospital April 1, 1904, age, 42. The diagnosis of dementia præcox, catatonic and paranoid, rested on the following mental symptoms: Delusions of persecution, poisoning, and of reference; markedly negativistic; hallucinations of hearing; increasing dementia. She died April 14, 1916. Unfortunately, she had been for so long a time in a highly negativistic, semistuporous state that no change was noted until just before death, when the distention of the abdomen became marked. Autopsy held eighteen hours later. Summary of gross findings: emaciation, poor development; small heart, 180 grams; small aorta; lungs, chronic passive congestion; atrophy of spleen, liver, pancreas and kidneys was marked; atrophy of ovaries and uterus; no arteriosclerosis anywhere.

Brain. — Few adhesions of dura; pia not remarkable; brain firm; section negative, except for slight congestion; weight of brain, 1,150 grams; spinal cord negative; pituitary negative.

Abdomen. — Volvulus was found of somewhat unusual character. The ascending colon had a long mesentery which had become twisted so that this portion of the gut was thrown over to the left side and the small intestines had looped themselves around the stalk in an intricate manner. The ascending colon was distended, deep red generally, and deep blackish red in places. There was no break anywhere noted. The small intestines were distended. Peritoneum and mesentery much injected and moist. Scattered small hemorrhages.

Cause of Death. — Volvulus. Passive congestion of lungs.

^{*} From the Pathological Laboratory of Taunton State Hospital. Reprinted from the Boston Medical and Surgical Journal, Vol. CLXXX, No. 8, pp. 207-209, Feb. 20, 1919.

Microscopic Examination. — The main interest centers on the nervous system, since there was nothing of unusual character in the body organs. In general, the macroscopic examination was confirmed.

Brain shows chronic changes often found after middle life and accompanying emaciation. Whether they are related to dementia præcox is not at all certain. There is atrophy of the nerve cells, especially the deeper layers; very slight satellitosis; lipochrome granules in the large nerve cells. Very occasionally a cell showing acute changes with diffuse Nissl staining and eccentric nucleus noted.

Sympathetic cells of solar plexus. Cells here show two types of change. First, a chronic type, characterized in the previous paper before mentioned as belonging to "neurathrepsia." There is increase of the capsular cells, with atrophy of nerve cells, marked pigmentation, which on analysis are lipochrome granules, eosinophilic granules, and by silver staining after the fat is removed, the black or argyrophilic granules. Second, acute changes of typical axonal nature are present. There is almost complete disappearance of the Nissl bodies, only the fringe of the cell staining a diffuse blue. The nucleus in the majority of cases is in the very periphery of the cell, and in certain cases has been completely extruded.

In striking contrast to the changes found in this ganglion is the condition presented by the Gasserian ganglion which, of course, represents anatomically and functionally a different type of ganglion. Here the cells show typical normal Nissl staining, and the nuclei are central. Though there are some chronic changes presented, nothing of acute nature has occurred.

Summary of Case. — A dementia præcox patient, woman of middle life, dying of volvulus, shows acute axonal reaction in the sympathetic cells of the solar plexus, without corresponding changes elsewhere.

Case 2. No. 20085, autopsy No. 146. Entered hospital April 22, 1912, 20 years of age; died March 26, 1916.

Summary of Clinical History. — Always backward; enuresis until the age of 15; active mental symptoms at 18. Physical examination at the time of entrance showed exaggerated tendon reflexes, ankle clonus; unsteady gait. Positive Wassermann reaction in blood. Spinal fluid: puncture attempted and unsuccessful because of patient's intense excitement and resistance. Mentally, patient is excited and grandiose. Gradually deteriorated, became apathetic and deeply demented — bedridden. She died on date mentioned. Had, clinically, signs that pointed to the consolidation of left lung.

Summary of Autopsy Findings. — Marked emaciation. Left lung is pushed upward and occupies only the upper part of the chest. Rest of pleural cavity occupied by serous fluid; no pus, no fibrin. There are a few scars, moderately calcified, in the thickened pleura of the apex. The lung is not solid.

Aortitis. Moderate myocarditis. Atrophy of spleen. Hepatitis. Cystic ovary.





Brain. — Typical well advanced general paresis; that is, thickened dura, cloudy and adherent pia, atrophy of convolutions in frontal and parietal portion with increased firmness, granulations in fourth ventricle, increased cerebrospinal fluid, etc. Cord shows moderate changes in posterior columns.

The large bowel and part of the ileum were distended with impacted feces. The blood vessels of the peritoneum were distended and engorged.

Microscopic Examination. — Lung shows congestion, compression, polymorphous and endothelial leukocytes in alveoli, no fibrin, occasional giant cell seen in thickened pleura. Brain: typical paresis. Perivascular spaces filled with lymphocytes and plasma cells. Pia thickened and contains exudate. Nerve cells show disarrangement of layers, atrophy, vacuolization. Diffuse Nissl staining. Central nuclei. Red cells present. Increased capillaries, increased neuroglia cells.

Sympathetic. — Very decided acute changes in nerve cells with only a slight fringe of methylene preceding cases; that is, there is pallor of the nerve cells with only a slight fringe of methylene blue staining material at the periphery. The nucleus is peripheral, and it shows varying degrees of extrusion. The chronic changes so well marked in the previous case are not nearly so prominent in this section; pigmentation is less marked.

Summary. — A juvenile paretic, dying of pleurisy with effusion of tubercular origin, fecal impaction and congestion of peritoneal blood vessels, shows acute axonal reaction in the sympathetic cells of the solar plexus.

Discussion.

The pathological condition here reported as occurring in insane patients is not at all related to the mental conditions of the patients, since in neither paresis nor dementia præcox, as these conditions come to the autopsy table, can it be found. This statement is based on routine study of over 100 cases. Nor can it be related to tuberculosis, which is the cause of death in the second case, for it is not present in other tubercular cases. Emaciation itself plays no part, for many of the patients who are autopsied in insane hospitals are emaciated, dying, as they do, of chronic diseases and often refusing nourishment. While it is impossible on the basis of two cases to make any conclusions regarding the phenomenon, a tentative relationship may be discussed. It is very possible that pathological conditions that affect the blood supply of the ganglion are responsible for the acute changes described. It is well known that the ligature of blood vessels leading to other parts of the nervous system produces such changes. The volvulus has its main effects through this change in blood supply, and it is conceivable that fecal impaction would disturb the circulation of the abdomen enough to produce anæmia or congestion to the nerve cells of the ganglion. If this be so, it is very likely that part of the collapse and shock noted in such conditions as volvulus, intussusception, and acute intestinal obstruction of any kind may be related to the changes in the nerve cells of the solar plexus. A disturbance created in the center which controls so many viscera and plays so large a part in blood vessel control may well be general in symptomatology.

Speculation becomes somewhat more precarious in passing from these acute conditions to chronic disturbance in the abdomen. Chronic congestion of the peritoneal vessels such as occurs with adhesions, obstipation, cirrhosis of the liver, etc., should be studied from the viewpoint here tentatively advanced. Mechanical and nutritive changes acting on the sympathetic cells of the abdomen rather than any auto-intoxication may account for the generalized symptomatology.

Here, too, it is possible that one may find an explanation of the change in mood, so often immediately noted after an evacuation of the bowels. The change produced is almost instantaneous with many people. Mood and emotion are largely vaso-visceral manifestations, and it seems to me likely that a loaded bowel changes conditions within the intestine in such a manner as to affect the blood supply of the sympathetic cells scattered in the ganglia throughout the posterior wall of the abdomen. That not all people are bothered by a loaded bowel may be explained by some difference in the architecture of the peritoneum, in the length of the attachments, any difference in the ligaments; in other words, it may be related to mechanical differences, so that congestion and vascular disturbances may much more easily be produced in certain individuals than in others.

A COMPARISON OF THE ANTERIOR HORN CELLS IN THE NORMAL SPINAL CORD AND AFTER AMPUTATION.*

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This work arose from the negative results of an examination, by a student in the department of neuropathology, of three spinal cords from cases having had amputation of a limb some time previous to death. The findings were so little in accord with the idea of post-amputation pathology gained from various textbooks that a further examination of cords was undertaken in the same manner from subjects not showing signs of cord lesions during life, and from that point of view called normal. Except for this general precaution material was chosen at random.

A variety of findings are recorded in the literature as a result of investigations of the changes in the anterior horn cells following amputation. No attempt has been made to include a complete literary review; the plan is only to give an idea of the varied results arrived at by a number of experienced investigators.

LITERATURE.

Campbell 1 says, after considerable work on this subject, "it may be explained that in consequence of such a lesion alterations occur in the spinal cord, and these in time occasion striking and characteristic appearances. In long-standing cases the predominant change is a homolateral atrophy, represented by a general reduction in volume of white and gray matter alike, and involving those particular segments of the cord which receive and give off the sensory and motor nerves which originally supplied the skin and muscles of the amputated member. Wasting of the gray substance is accompanied by the numerical reduction of its contained nerve cells, both large and small, and while all the cell collections in the anterior cornu suffer, one special group may be singled out as being specially prone to atrophy, namely, the posterolateral."

^{*} Contribution in a series offered to Prof. E. E. Southard in honor of the decennium of the Bullard Professorship of Neuropathology, Harvard Medical School.

Marinesco,² one of the earlier investigators of this question, is one very often quoted. His report includes three cases: one with duration of twenty-one years; one ten years; and the third of unknown duration. He found changes in anterior horn cells: in the first two cases a reduction in number on the side of the amputation, not only in the lateral, but in other groups; in the third case neither the cell count in the posterolateral group nor of all cells in all groups have sufficient significance to conclude that there is any definite change in the cells.

Edinger ³ reports a case of prenatal amputation of the left lower arm with death at fifty-two years of age. The left side of the cord corresponding to the four lower cervical and first two dorsal segments showed a distinct atrophy of the anterior horn, which was greatest at the level of the sixth and seventh cervical segments. There was also a distinct decrease in the size and number of the anterior horn cells, especially at the anterolateral and posterolateral angles of the anterior horn. In three additional cases of post-amputation, no convincing proof of cell atrophy was found in the anterior horns.

Van Gehuchten 4 examined the lumbosacral cord from a case twelve years after amputation of the lower extremity in the middle portion of the thigh. The anterior horn cells representing the foot muscles were normal, while the cells representing the muscles below the knee had disappeared in spite of the fact that the axons of both groups of cells had been divided.

Déjerine and Mayer ⁵ studied eight cases of amputation varying from four to forty years following amputation. They found in all cases a definite decrease in the size of the side of the cord corresponding to the amputation, affecting both white and gray matter, both anterior and posterior. In only one case were histologic changes found; this was following amputation of the thigh, of thirty years' duration. In the middle of the lumbar enlargement a definite decrease in the number of anterior horn cells appeared, the number being only a third of the normal side, and the anteromesial group was the one most affected.

Elders,⁶ in an excellent article, reports the examination of the cord of a person born without the left lower arm. Death occurred at fifty-four years of age. In the lower half of the left cervical segment the posterolateral angle was rounder and shorter than the right, and contained fewer cells.

Dreschfeld revamined a case of amputation of the left thigh fifteen years after operation, and found atrophy of the anterior

horn and some change in the posterior horn in the lower part of the left lumbar enlargement, with decrease in number and atrophy of the nerve cells of the intermediolateral group.

Kahler and Pick 8 report two cases, one of which was an amputation of the lower third of the left thigh eighteen years after operation. The anterior horn cells were decreased in the anterior group. The second case was an amputation of the left forearm in the lower third. He reports partial atrophy and decrease in the number of cells in the lateral group.

Dickinson 9 reports findings on a case of amputation of the right leg fifteen years before death, in which there was a decrease in the number and size of the nerve cells of the corresponding side.

Genzmer ¹⁰ found decrease in size of anterior horn and in the number of anterior horn cells on the amputated side in a case of amputation of the lower third of the right thigh thirty years before death.

Hayem ¹¹ examined the cord in the case of exarticulation of the wrist five years after operation, and found general atrophy of the anterior horn with atrophy of nerve cells, most marked at the level of the eighth cervical and first dorsal nerves.

Friedreich's ¹² case of amputation of the left forearm twelve years before death showed no changes in the cord; the anterior horn cells were intact.

ANIMAL EXPERIMENT.

Experimental work also has been done on various laboratory animals, both by section of nerve trunks and by amputation of extremities.

Van Gehuchten 4 divided the sciatic nerve and later found only the cells of the posterolateral group affected.

Homen's ¹³ work on animals showed a slight atrophy and decrease in the number of cells of the anterior horn. The individual cells were found in general somewhat smaller than the corresponding ones, on the opposite side. No changes were found in the brain.

The experimental work of Warrington ¹⁴ is a more recent and detailed investigation of the changes of the anterior horn cells after section of the spinal nerve roots. In some instances changes were found both in anterior and posterior horn cells corresponding to the side operated on. He reports finding changes not only on the corresponding side, but also on the

opposite side. "After section of several posterior roots from the VIth to the IXth post thoracic, inclusive, a considerable percentage of obviously altered cells are found. Their distribution in the case of the cat is practically limited to the VIIth and VIIIth segments, and especially to the posterolateral group of cells in those segments. In the monkey the upper part of the VIIth segment is picked out. The effect is to a very slight extent a crossed one, and presents the remarkable feature that more affected cells were found in the VIth segment of the crossed side than on the side of the lesion." Further, "The view I wish to maintain is that the changes are the result of the withdrawal of the afferent impulses which normally impinge on cornual cells. Histological evidence shows that the posteroexternal group of anterior horn cells is most richly innervated by the collaterals from the posterior roots." He thus explains the degeneration of this group of cells, and adds further, with emphasis, that the changes occurring after section of the posterior roots are much more intense, and that the ultimate destruction of these cells is more likely to occur than after the division of the anterior roots alone. After section of both anterior and posterior roots all the larger cells on the side of the lesion showed changes. The greater number were only slightly affected compared to the extent seen after section of an anterior nerve root alone; others, however, showed a much more marked chromatolysis, the changes resembling those found after section of the afferent roots. He finally concludes that there is a tendency for the altered cells to return to their normal structure regardless of the regeneration of their axons, in conformity with the opinions of Van Gehuchten and Nissl. 15

FROM TEXTBOOKS.

Concerning the change in the anterior horn cells following division of their fibers Oppenheim ¹⁶ says: "The Nissl stain shows destruction of the granules and an excentric position of the nucleus. If a restitution in the periphery takes place, regeneration results. If, however, there is no peripheral regeneration, further change in the form of atrophy takes place in the cells."

Van Gehuchten: The section of the axon leads to a rapid swelling of the cell protoplasm, and consequent displacement of the nucleus. He believes that in a small number of cases the swelling of the cell body takes place so rapidly, and the force which pushes the nucleus to one side is so powerful, that it is

driven completely out of the cell body. These cells are the only ones, he concludes, which completely atrophy, while all the others slowly return to normal.

Déjerine and Thomas: ¹⁷ For localization studies, division of nerves has been made. In man, the cords of persons having had amputations have been studied with the same end in view, but the application of this method has not always been free from reproach.

Schafer: If the degeneration has been caused by section of the axon, the reparative process is very slow, so that it may be three or four months before it is completed. At the end of this time the nerve-cell bodies have resumed their original appearance even though reparation of the cut nerve may be incomplete.

Barker: ¹⁸ The motor fibers of the central stump gradually diminish in number; in some instances they appear to vanish almost totally, and a large number of the motor cells of the ventral horns dwindle in size, and after a time actually may be lost.

MATERIAL EXAMINED.

The tissue was prepared in serial paraffin sections, 6 microns thick, and stained by the cresylechtviolet cell-stain method.

Material from three cases of amputation was examined as a starting point of this work, and mainly from the point of view of loss of anterior horn cells. Sections were examined from the segments of the cord corresponding to the part amputated, and the cells of both anterior horns were counted.

Case 1. — Man, aged 79, sixty years after amputation of left arm. The anterior horn cells showed no chromatolysis, but many of the cells were well filled with lipochrome. This is not unusual in view of the age of the man. One hundred and thirty-three serial sections were counted. The variation in individual sections was considerable, but the final average of all counts was, right 17, left 19, or an average of two cells more on the amputated than on the opposite side.

In the brain the Betz cells and other large elements contained much lipochrome, but showed no reaction to the amputation.

Case 2. — Man, aged 65 years, recent amputation of lower third of the left leg. The anterior horn cells were very little altered. There was no chromatolysis, and very little lipochrome. Forty-one serial sections were counted. Variation in individual sections was as much as 62:38 between the two sides. The average of the total number counted was, right 52, left 55, or an average of three more cells on the amputated side. As the operation in this case was performed only the day before death

(following gangrene of the foot), no permanent change in nerve cells would be expected. No axonal change had taken place.

Case 3. — Female, aged 73, old amputation of right thigh. The anterior horn cells contained a great deal of lipochrome, but also some normal Nissl granules. A total of 41 counts was made on serial sections. The variation in individual sections was as great as 13:32. The total average was, right 21.8, left 23.9, or an average of two more cells on the non-amputated than on the amputated side.

In addition to these counts others were made on material from a variety of cases, with the single precaution that they show no clinical signs of cord involvement. Both sexes were included, and the ages ranged from eleven months to seventy-one years.

One case, considered particularly suitable for use as a normal control, was that of a young male adult, thirty-seven years of age. Here the average of 67 counts in the cervical region was 50 on one side and 54 on the other; of 53 counts in the dorsal region, 12.0 on one side and 12.9 on the other; in the lumbar region the average of 62 counts was 49.5 on one side and 52.0 on the other. This variation is seen to be greater than in the cases of amputation. In Marinesco's 2 work the greatest number of sections of one level counted is 16, and the variation in the sum total is 245: 223. In the instances where a smaller number of sections were counted, the difference between the two sides was even greater. In the case of the normal control just described, in one group of 21 counts, the total was 938 on one side and 1,181 on the other; but in the final sum of all counts, 67 in all, the number was 2,603 on one side and 2,684 on the other.

In the accompanying table the detail of the entire number of cases counted may be seen. No attempt was made to identify the exact segment of the cord from which the blocks were taken, as much of the material was already embedded without regard to this detail; consequently, there is a great difference in the count at the varying levels. It may be noted also that numbers are much larger up to and including Case 26 than in the subsequent ones. This is due to the fact that in the earlier cases all cells were counted which represented the full contour of a cell including any of its processes, exclusive of whether it contained a nucleus or not. Later, only those cells were counted which contained a stained nucleus. But since the comparison is that of the two sides of the cord, and not between different specimens, the relation is not altered.

Table showing Counts of Anterior Horn Cells in Serial Sections of Spinal Cord.

Following Amputation.

	Diagnosis.	Sex.	Age.	CERVICAL.		Dorsal.		LUMBAR.		Sections
Case.				1.	2.	1.	2.	1.	2.	counted.
1	Amputation, left arm.	M	79	19.3	17.4	_	-	_	_	133
2	Amputation, left	M	65	-	- /	-	- /	55.	52.	41
3	leg. Amputation, right leg.	F	73	-	-	-	-	23.9	21.8	41

Without Amputation.

4	Congenital syphi-	F	13	15.	16.	6.	5.7	16.	17.8	C.15-D.17-L.18
5	Not insane, .	M	6	14.	18.6	4.9	5.	18. 1	15.	C.15-D.15-L.16
6	Organic dementia,	M	42	23.	31.8	5.51	6.	37.5	28.	C.16-D.14-L.15
7	Mongolian idiot, .	F	6	11.8	12.	11.6	14.	28.81	27.	C.15-D.26-L.26
8	Idiot,	M	17	43.	52.7	10.7	10.8	29.4	31.	C.18-D.22-L.19
9	Imbecile,	F	46	36.	32.	6.	6.	34.	31.	C.18-D.17-L.15
10	Alcoholic,	F	38	30.71	28.	6.1	6.	33.1	37.	C.16-D.17-L.15
11	Auto-intoxication,	F	42	29.1	34.	7.1	6.	33.71	35.	C.16-D.34-L.18
12	Alcoholic delirium,	F	32	27.61	41.6	6.81	7.	27.	28.6	C.15-D.33-L.18
13	Special control, .	M	37	50.4	54.3	12.	12.9	49.5	52.4	C.67-D.53-L.62
14	Presenile depres-	F	68	23.51	22.5	4.1	5.	19.91	17.9	C.15-D.15-L.15
15	sion. Unclassified, .	M	71	19.4	19.6	2.8	3.8	19.	17.8	C.15-D.15-L.15
16	Delirium,	F		14.9	13.4	2.6	2.5	17.8	19.2	C.15-D.36-L.15
17	Not insane, .	F	51	-	-	8.	8.6	22.7	21.8	D.34-L.14
18	Dementia præcox,	F	40	21.1	25.	5.91	5.4	14.1	11.	C.21-D.18-L.22
19	Imbecile,	M	34	34.31	21.3	11.31	6.3	24.91	23.4	C.20-D.25-L.20
20	General paresis, .	M	39	20.41	20.2	3.1	3.1	8.21	8.5	C.20-D.20-L.20
21	Unclassified, .	M	21	-	_	4.	4.	14. 1	13.5	D.41-L.25
22	Chronic dementia,	F	40	8.91	8.1	1.81	3.	11. 1	9.1	C.31-D.21-L.33
23	Puerperal mania,	F	24	6.61	7.8	2.11	2.	7.41	8.7	C.21-D.22-L.20
24	Uremic intoxica-	F	28	4.1	5.6	1.31	1.9	7.71	6.6	C.23-D.32-L.21
25	tion. Dementia præcox,	F	35	6.51	6.9	1.21	1.2	10.31	10.4	C.20-D.22-I20
26	Imbecile,	M	36	5.51	3.4	2.11	2.2	-	-	C.16-D.17
27	Infant,	-	11 mos.	6.91	6.2	3.1	3.8	13.1	12.6	C.23-D.22-L.22
28	Unclassified, .	\mathbf{F} $\left\{ \right.$	3 yrs. 10 mos.	} -	-	3.1	2.7	17.1	19.	D.24-L.24

¹ Left side of cord.

These results contribute something also to the question of whether the number of cells is greater on one side or the other from the standpoint of right and left handedness. It will be seen that there is no constant relation throughout the list, the number being greater as an average on one side in some instances, and less on the same side in another, with very slight variation in any case, and no more in the cervical than in the lumbar region. By means of a low-power lens it may be seen in progressing from one section to another that one horn contains the greater number of cells, first on one side and then on the other, and the same variation is seen in the individual cell groups.

It may be noted here that Bruce ¹⁹ found only the fifth cord specimen examined suitable for use in preparing his "Atlas of the Spinal Cord."

SUMMARY.

Cell counts were made on the anterior horns of the spinal cord in 28 cases. Three of these were cases following amputation of an extremity. The 25 additional cases were said not to have had signs of a cord lesion.

Variation in the counts between the two sides in the amputated cases was not more than two or three cells in the final average. In two of these the greater number was on the side corresponding to the amputation.

Variation in the counts between the two sides in the cases without amputation was at times greater than with amputation.

In the sections where identification was made of the right and left sides there appears no uniform difference between the two corresponding counts.

Conclusions.

The literature contains a variety of opinions concerning the permanent changes in the anterior horn cells of the spinal cord following amputation.

A fairly large number of counts of anterior horn cells of the spinal cord from cases without amputation show as great a variation in the number of cells as in cases with amputation.

In the material examined there seems to be no constant variation between the number of anterior horn cells in the right and left sides of the spinal cord.

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A CONSIDERATION OF THE NATURE OF AURÆ.*

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Descriptive and statistical studies of auræ are to be found in textbooks of nervous and mental disease, treatises on epilepsy and migraine and special articles, but these sources of information are searched almost in vain for an exposition of the particular conditions of the nervous system or of the mind that favor the occurrence of auræ. Such references as one finds generally are bare statements unsupported by argument, and obviously taken without question from the conclusions of some distinguished investigator. That these references are scarce and unconvincing is not surprising in view of the difficulty of investigating auræ, as well as other phenomena connected with epilepsy and migraine, first hand in the person afflicted.

The subject would seem to be worthy of consideration, however, because without a proper understanding of the underlying conditions it is hardly possible either to form a satisfactory opinion of the relation of auræ to the convulsions in epilepsy, or to the headaches in migraine; or to make an accurate statistical or analytic study of auræ themselves. In this article, therefore, an attempt is made, first, to bring forward objections to what seems to be the prevailing view; second, to point out anew the relation of auræ to a certain mental state, and finally, to suggest some factors that may influence the form the auræ may take.

AURÆ OF EPILEPSY.

Objections to Prevailing View on Aura. — The notion of aurae that is most popular with the authors of textbooks probably originated with Hughlings Jackson, but is given very clearly and concisely in these words of Gowers: 2—

This immediate warning is of the greatest importance. . . . The sensation is the effect on consciousness of the commencing process of discharge, which begins in structures by which these are influenced that are highest

^{*} Contribution in a series offered to Prof. E. E. Southard, in honor of the decennium of the Bullard Professorship of Neuropathology, Harvard Medical School.

in function and related closely to consciousness. The warning is thus an indication of the part of the brain in which discharge begins, because the place where it first attains such an intensity as to cause a sensation must be the place at which it starts. . . Their interest is great, but their practical value is almost limited to the detection of attacks which might otherwise be unperceived, by the evidence their character affords, and by their frequent indication that the instability is the result of a local lesion of the brain.

There is in this conception of the nature of auræ an application to the sensory component of the epileptic attack of one theory of the origin of convulsions, namely, that which assumes them to be the result of a "discharge" of nervous energy in the motor cells of the precentral area.

Even though this conception of the origin of the convulsive movements of epilepsy be accepted as satisfactory, its application in the explanation of auræ may be objected to. The convulsive movements are of sudden onset, and display little evidence of a co-ordination of nervous processes. On the other hand, the aura may be relatively slow in evolution, and, if complex in nature, indicates a delicate co-ordination of nervous impulses that is inconsistent with the notion of a "discharge." Further, the conception is incomplete in that it does not indicate the relation of the auræ which occur in the presence of an organic lesion to those which occur in brains apparently normal in structure. It is begging the question to get over this difficulty by assuming all cases of epilepsy to be the result of an organic brain disease. Structural changes that probably are not secondary are not found in a large proportion of the brains of a certain type of epileptics. In a still larger proportion the aura is not associated with changes in special sense centers that correspond to the special sense in which the aura occurs. cannot reasonably be stated, then, that the aura of a special sense indicates or may indicate structural or even functional changes of a pathologic nature in the centers of that sense. theory of auræ should make clear in how far a particular aura may be determined by structural changes, and where these changes should be looked for.

In view of the relative futility of efforts to investigate auræ first hand in afflicted persons, it is well to attempt to employ another method, *i.e.*, try to get some light from a study of similar and perhaps less inaccessible phenomena, if such can be found, and to apply the information thus obtained by analogy.

There is a mental phenomenon, or rather a series of allied phenomena, of common occurrence in man, namely, hallucinations, to which it would seem auræ could be safely compared. Parish.³ McDougal 4 and others have noted the similarity of these manifestations of mental activity. Although some conspicuous differences may immediately stand forth, it is apparent that they are not essentially dissimilar. The subject-matter of the one can generally be essentially duplicated in the other. The senses of sight and hearing, moreover, are represented in both in a similar proportion, — as 71 to 29 in some statistics of the occurrence of auræ collected from several sources, and as 70 to 30 in the statistics of the occurrence of hallucinations collected by Parish.⁵ The half-recalled memories or "deja vu" phenomena of certain incomplete attacks have many parallels, occurring in connection with sleep and certain waking mental states. insuperable objection to this comparison is evident, at first sight at least.

Relation of Auræ to Other Hallucinations. — Hallucinations are common in both abnormal and physiologic mental states. Their occurrence in the insane and in those addicted to the use of drugs and alcohol is well known. The most common manifestation in physiologic states occurs in connection with sleep, in the form of dreams. There are also the hallucinations of hypnosis, of crystal gazing and of the psychic medium. Finally, there is the spontaneously occurring variety so much studied by spiritualists, and commonly known as visions.

According to Parish 6 there is a common mental state underlying all hallucinations which he designates "dissociation of consciousness." By this term he refers to a state of consciousness that differs from the waking state, in that normal association of ideas does not occur, or in which, as James expresses it, ideas are "deprived of their reductives." Leaving aside as too complicated for consideration the pathologic state in which hallucinations are found, there is the loss of consciousness to a greater or less degree in sleep, and a similar, but less profound, loss in hypnosis and crystal gazing, which favors the production of hallucinations. That the psychic medium usually gives her information with eyes closed would indicate that she may be at such times in a state of autohypnosis. In the case reported by Prince,7 visions appeared in a prospective medium only after she had gone through a preliminary course of training, which consisted in gazing intently at a small point on a table for a

long time. She doubtless was thus acquiring the power of autohypnosis. In the case of the visions reported by various societies for psychical research, Parish was able to demonstrate that in a large proportion they occurred under conditions that favor sleep, or during emotions such as grief, fear or excitement that may produce a somewhat similar dissociation of consciousness. Before reading the conclusions of Parish I had been impressed with this association merely in going over accounts of visions by various authors.

There is in epilepsy a disturbance of consciousness in the form of a loss. The depth of the unconscious state precludes the recollection of any visions occurring at this time, but there is a brief interval before consciousness is entirely lost that is probably not unlike the normal drowsy state, and during which there are probably conditions which have been shown to be suitable for the development of hallucinations. That hallucinations or auræ do occur at this time is, therefore, not surprising. Hence one should consider auræ as having an origin somewhat similar to that of hallucinations in normal persons, and should not assume, as Gowers and others have assumed, that they result from a "discharge" of an epileptic nature, due perhaps to a local lesion.

Factors influencing the Form of Aura. — If this assumption be true, the content of auræ should in general be derived as are dreams and visions. They may represent a fragment of memory, as was the case with one patient of mine whose aura consisted of a familiar face, — not always the same face, however, — and with another, whose aura was the vision of a disagreeable old woman he had known in childhood. In this connection it is interesting to recall the suggestion of Schwab 8 that auræ may represent memory pictures of events attending the first fit, which have been "fixed," so to speak, by the strong attending emotional reaction. Further, the aura may consist of diminution or distortion of normal perceptions - micropsia, macropsia, etc. - which occurs also in connection with sleep. Finally, the underlying factor may be structural change. Since disease of the organs of special sense or of their pathways leading to the brain may lead to the formation of hallucinations in the corresponding sensory spheres in either the sane or the insane,9 similar changes may influence auræ. Turner 10 considered these factors, in the case of auditory auræ, without much success, but the subject is worthy of further study.

Some points at which auræ and other varieties of hallucinations differ are worthy of consideration. There is, first, variability, auræ being constant in most cases and hallucinations generally fleeting. This difference may be in part explained by one of the characteristics of epilepsy, namely, stereotypy. general, the various reactions in epilepsy tend to be constant; hence, the preconvulsional disturbance of consciousness should be about the same in all attacks. This being true, the aura would be expected to be relatively constant. On the other hand, drowsy states vary within the widest limits, and in them, unlike epileptic mental states, consciousness is often very receptive to external stimuli. It is therefore not surprising that the hallucinations should vary. Another point of difference is the absence of hallucinations during and after the convulsion. The depth of unconsciousness and fatigue factors may account for this lack. Some authors have assumed, however, that hallucinations do occur at this time.

AURÆ OF MIGRAINE.

As regards migraine, the problem is more obscure. Parallels for some of the auræ of migraine, such as the fortification spectrum described by Gowers, for instance, are rare; but as auræ of this type seldom appear, few parallels should be expected. In visions and hallucinations bright lights and brilliantly colored objects are not unusual. Not unlike some migrainous auræ is the vision of the boy, described by Gurney,11 who saw in the dark a distant, tiny, luminous point approaching and increasing in size and becoming a face, and finally a mass of luminous faces unlike anything he had ever seen. A patient of mine had, after retiring and before falling asleep, a vision consisting of a "head of flame." That some disturbance of consciousness occurs with migraine there can be little doubt. Migraine is regarded by many as akin to epilepsy, and various abnormal sleepstates are commonly associated with it. One would think that conditions in migraine are even more favorable for the formation of hallucination than are those in epilepsy, inasmuch as in migraine the march of symptoms is slow, and consciousness is not lost.

There remains to be considered the relation of the localized brain lesion to auræ. That there is an association of olfactory auræ with certain local lesions, Hughlings Jackson, ¹² Gowers ¹³ and Southard ¹⁴ have conclusively demonstrated. This fact, instead of controverting the view that auræ are merely a type of hal-

lucination, is itself made clear by some characteristics of hallucinations. It already has been pointed out that lesions of organs of special sense or of their pathways leading to the brain may predispose to aura formation. In the case of the brain lesion, then, it may be assumed that the same principle is at work, the only difference being that interruption of peripheral impulses occurs in the brain rather than in the peripheral pathways. Indeed, this principle can be applied in instances where another, let us say that of direct irritation to the cortical cells, cannot be. In a case with olfactory auræ described by Jackson, 12 for instance, the lesion found post mortem was a cyst of softening in the hippocampal gyrus. According to a dictum of Jackson himself, a purely destructive lesion should not be considered as acting as an irritant on surrounding cortical substance. Again, in a case with a similar type of aura, quoted by Gowers, 13 the lesion found at necropsy was a gumma of one olfactory lobe. In neither of these cases, then, can the aura have resulted from an irritation of the olfactory cortex, but both are easily explained as the result in the center of a disturbance of incoming nervous impulses.

CONCLUSION.

By way of summary it may be stated that I have attempted to point out anew the analogy between auræ and the hallucinations occurring in connection with sleep, hypnosis, crystal gazing, etc. According to this view, auræ should be regarded not as the result of "discharges" of an epileptic nature in some part of the cortex, but as deficiency reactions, like dreams, occurring when there is a "disturbance of consciousness" of a certain type. Their relation to the loss or disturbance of consciousness in epilepsy and migraine is assumed to be the same as that of dreams to drowsy or sleep states; and their content should be regarded as being determined by the same factors that determine the content of dreams and similar hallucinations. Their relation to structural changes may be the same as that of those hallucinations which develop in connection with disease of the organs of special sense or of the nerves connecting them with the brain.

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BRAIN TUMORS AS SEEN IN HOSPITALS FOR THE INSANE.*

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It is not a rare experience for the pathologist in a hospital for the insane to find at necropsy a brain tumor undiagnosed during life. The objects of this paper are to inquire into the reasons for the lack of diagnosis, and to find out whether the group of brain tumor cases in hospitals for the insane presents any special characteristics as to symptomatology, age or stage of disease on admission, which would distinguish them from cases in general hospitals.

All brain tumor cases coming to necropsy during the past ten years in the Boston, Danvers, Taunton, Westborough and Worcester State hospitals and the Psychopathic Hospital were studied, as were also single cases at the Medfield, Foxborough, Bridgewater and Northampton State hospitals. Gummas were excluded. The histories and necropsy protocols of 46 cases thus collected were studied, and in most instances the brains were examined in frontal sections. In about half of the cases the brains and cords were also studied histologically.

The percentage of brain tumors as compared to the total number of necropsies agrees fairly closely in the different institutions: Boston State Hospital, 1.9; Danvers State Hospital, 1.3; and Westborough State Hospital, 2.6. These percentages are about the same as that found by Cushing 1 in the Johns Hopkins Hospital necropsy records up to January, 109, namely, 1.7 per cent.

The age incidence of patients with brain tumors in the State hospital groups presents an interesting and significant deviation from that of such patients in general. The distribution by decades is: from eleven to twenty years, 1; from twenty-one to thirty, 3; from thirty-one to forty, 4; from forty-one to fifty, 18; from fifty-one to sixty, 13; from sixty-one to seventy, 5; from seventy-one to eighty, 1; from eighty-one to ninety, 1.

The average age is fifty years. Bruns² states that brain tumors are most frequent from puberty to thirty years, then

^{*} From the Laboratory of the Boston State Hospital. Contribution in a series offered to Prof. E. E. Southard in honor of the decennium of the Bullard Professorship of Neuropathology, Harvard Medical School.

from thirty to forty years; more than half of his cases occurred between the twentieth and fortieth years. He, however, includes tubercles and gummas, so that the two series are not strictly comparable. In Cushing's series of 130 cases the maximum number occurred between the twentieth and fortieth years. It appears, however, that the average age of patients with brain tumor sent to hospitals for the insane is greater than that of brain tumor patients in general.

The sites of the tumors, in order of frequency, were: frontal, 15; temporal, 6; multiple (metastatic), pituitary and intraventricular, 4 each; cerebellar or cerebellopontile, 5; central fields, parietal and corpus callosum, 2 each; occipital and peduncular, 1 each. The large proportion of frontal tumors (33 per cent) is significant, as in the statistics of Schuster 3 for brain tumors in general, cerebellar growths lead, with a percentage of 21.6; followed by multiple, 14.7 per cent; frontal, 12.1 per cent, and central, 12 per cent.

Table 1. — Sources	of Group of	Patients with	Brain	Tumor	sent to
	Hospitals for	or the Insane.			

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Sent by private physicians (undiagnosed),	31					
Sent from general hospitals (undiagnosed),	6					
Sent from general and special hospitals (diagnosed),	2					
Sent from general hospitals after operation for brain tumor,	2					
Developed in patients in hospitals for the insane,	4					
Voluntary admission,	1					
	10					
	46					
Table 2. — Stage of Disease at which Patients were admitted.						
Early, that is, soon after the appearance of the symptoms, 1	4					
Advanced, the symptoms dating back from one and a half to three						
years, and the patients living from one to four years after commit-						
ment,	8					
Greatly advanced, the patients surviving only a few months after						
admission,	19					
Terminal,	11					
·						
* Table 3. — Symptoms necessitating Commitment.						
Simple deterioration (neurologic signs also present),	10					
Convulsions, with or without mental deterioration,	4					
Confusion, hallucinations and disturbances of memory, the latter						
appearing as transitory amnesia, a general reduction of immediate						

¹ One patient was sent to an institution for epileptics and later to a hospital for the insane.

9

and remote memory, or an almost total loss of immediate reten-

Lethargy and somnolence,	8
Symptoms of psychosis (manic-depressive, dementia præcox and	
senile dementia) antedating symptoms of tumor, but the latter	
present at time of admission,	5
Aphasic and apraxic disturbances,	3
Predominantly physical disabilities (blindness and deafness), with	
irritability and mild paranoid trend,	2
Confusion and physical weakness,	1

The diagnoses made after the patients reached the hospitals for the insane revealed the small percentage of cases in which the correct diagnosis was made and the conditions with which brain tumor was confused. The diagnoses were: brain tumor, 15; "organic dementia," 8; cerebral arteriosclerosis, 4; epilepsy and paresis, 3 each; cerebellar disease, 2; cerebral hemorrhage, Korsakoff's psychosis, manic-depressive and dementia præcox, 1 each; unclassified, 2; senile dementia, 2.

MISTAKES IN DIAGNOSIS.

The diagnosis of brain tumor was made in only one-third of the cases (including four admitted from other hospitals with the correct diagnosis). The cases diagnosed as paresis would probably be correctly diagnosed at the present time, with the routine examinations of the spinal fluid now general in hospitals for the insane. Tumors in senile persons are difficult to diagnose. Mistakes in diagnosis tend to fall into three groups: deteriorated cases with neurologic signs are called paresis, Korsakoff's psychosis, or put into the catchall of "organic dementia;" cases presenting focal signs are confused with arteriosclerosis; and those with convulsions are merely called epilepsy.

A surprisingly small proportion of cases of brain tumor are diagnosed correctly. There are several reasons: First, the training and point of view of the physician in a hospital for the insane is psychiatric rather than neurologic, and he is preoccupied with the mental symptoms. In general hospitals, of course, the reverse tendency prevails. Second, the most fundamental reason is that, as a rule, ophthalmoscopic examinations of patients presenting organic signs are not made unless brain tumor is definitely suspected. If such examinations were made, a much larger percentage of tumors would be diagnosed, and until they are made as a routine measure, the percentage of cases of brain tumor diagnosed will not be much raised. It would appear that

there is no more reason for neglecting this diagnostic aid in any organic case than for omitting a Wassermann test. Third, the use of the term "organic dementia" as a sufficient designation discourages any refinement of diagnosis. Fourth, the group of tumor cases seen at State hospitals offers peculiar liability to confusion in diagnosis. A large proportion of the cases occur in middle age when deteriorating psychoses, such as paresis, Korsakoff's psychosis, and cerebral arteriosclerosis, are common, and are naturally first considered. This is particularly true of cerebral arteriosclerosis, which frequently coexists with brain tumor; when it occurs, the exclusive diagnosis of arteriosclerosis is apt to be made to cover all symptoms.

A study of the frequency of arteriosclerosis was made in all the available brains of this series. In 18 of 39 there was notable arteriosclerosis, both of the basal and of the small cortical vessels, all in persons of the fifth decade or beyond. In 8 the degree of arteriosclerosis was advanced, and in 3, small cysts of softening were present.

A microscopic study of the brain was made in 19 cases. The changes in regions not immediately affected by the tumor were not uniform, nor were they striking, aside from the cases in which arteriosclerosis was present. Lamination was well preserved, but the cells were sometimes askew in arrangement. Chromatolysis was occasionally present, as was an increase of satellites and perivascular pigment. Gliosis, particularly subpial, was frequent in both the arteriosclerotic and non-arteriosclerotic cases.

Certain tumor groups are of particular psychiatric interest, namely, the frontal, temporal, parietal, ventricular and callosal. These will be considered in detail elsewhere, and only a few points touched on here.

FRONTAL TUMORS.

It is difficult to get a clear-cut clinical picture of this group. All of the patients except two (an alcoholic dement and a senile patient) were admitted in the late or terminal stage, and the most prominent feature at the time of entrance was deterioration, usually accompanied by apathy, sometimes, however, by confusion and excitement, and frequently by somnolence. Deterioration was the most pronounced and constant characteristic. The special importance of frontal tumors for the production of dementia is generally assumed, but has been ques-

tioned by Von Monakow,⁴ Müller ⁵ and Bruns, among others, their view being that frontal growths usually attain a large size before encroaching on vital centers, and that the psychic changes attributed to the specific involvement of the frontal areas are in reality due to diffuse injury of the cortex, increase in intracranial pressure, and interference with circulation. This series is not adapted to throwing light on the question because of the advanced stage at which the patients came under observation, and because of the lack, in most cases, of a full history of the early part of the illness. Nor was it possible always to differentiate between "Benommenheit" and true dementia, although the descriptions in most instances leave no doubt that there was real mental reduction.

Müller,⁵ in his analysis of 164 cases of frontal tumor, finds that a larger proportion occur in middle life (from forty to sixty years) than is the case with tumors of other regions. The maximum of his curve is at from thirty-one to forty years, 26 per cent, followed by 20 per cent at from forty-one to fifty years, and 16 per cent at from fifty-one to sixty years. The distribution of the State hospital series is: from eleven to twenty years, 1; from twenty-one to thirty, 0; from thirty-one to forty, 2; from forty-one to fifty, 6; from fifty-one to sixty, 3; from sixty-one to seventy, 2; from seventy-one to eighty, 0; from eighty-one to ninety, 1.

The average age is fifty and one-half years. There are no significant differences between the average ages of patients with frontal tumors and those with tumors of other areas (posterior fossa, forty-five and one-half years; all regions except frontal, forty-eight years), but it is interesting to note that the average age for all classes of tumors is above that given by Müller.

Epileptic convulsions were present over a considerable period in 3 patients, frontal ataxia in 3 (causing the diagnosis of cerebellar disease), and in 2 patients there was early the somnolence supposed to be particularly characteristic of frontal growths.

The large percentage of frontal tumors in the State hospital series may be due, not to any peculiar relation between frontal growths and dementia, but to the fact that disturbances from these tumors are, in many cases, not obvious, unless the patients are under close observation (as they usually are not) until a late stage, when the final deterioration necessitates commitment; also, in the absence of striking neurologic signs, the psychic symptoms stand in the foreground, and the patient is sent

to a hospital for the insane rather than to a general hospital. Another factor, that of an increasing tendency to deterioration with advancing age, will be discussed later.

TUMORS OF TEMPORAL LOBES.

Tumors of the temporal lobes are of special interest on account of uncertainty of the diagnostic features of tumors in these regions. Cushing states that, with the exception of the uncinate area, the temporal lobe is a relatively silent region, even on the left. Several authors have tried to differentiate a syndrome common to tumors of both sides. Foster Kennedy 6 emphasizes the epileptic convulsions and their equivalents of dreamy states; crude, subjective sensations of smell and taste, with or without involuntary movements of mastication; and after the attacks, transient weakness of the contralateral lower facial muscles, less often of the arm and leg, and increase of the deep reflexes. The motor symptoms and reflex changes later become persistent. Albert Knapp 7 gives as a syndrome characteristic of both lobes, homolateral ptosis and mydriasis, contralateral hemiplegia and cerebellar ataxia. Bruns and Aswazoturow 8 consider that periods of auditory hallucinosis may be the equivalent of the convulsions. Mingazzini 9 divides the temporal lobe into four zones, the tumors of each having a characteristic symptomatology. Zone 1 consists of the anterior portion of the convex surface, and its syndrome is total hemiparesis, associated with contralateral ptosis and paresis of one or both abducens. Zone 2 comprises the posterior half of the convex surface. In tumors of this region hemiparesis is almost constant, and all branches of the oculomotor may be affected; also, there is a tendency to conjugate deviation of head and eyes and ataxia of the cerebellar type. If the tumor is on the left, sensory aphasia or dysarthria are present with tumors of both zones. In the third zone, the posterior part of the inferior surface, the most frequent signs are unilateral paralysis of the abducens, isolated paralysis of the facial, contralateral ptosis, hemiparesis and hemianesthesia. Aphasic disturbances are frequently absent. The fourth zone includes the anterior part of the inferior-internal surface, and in tumors of this area hallucinations of taste and smell are common.

Arranging the present cases according to Mingazzini's classification, there were two tumors involving zone 1, the first extending beyond the limits of the zone. The case presents so

many features of interest, both psychiatric and neurologic, that it is given in abstract. The patient, a left-handed person with a left-sided tumor, had also the nearest approach to Witzelsucht of any of the State hospital cases.

Case 1. History. — A woman, aged 35, sent to the Boston State Hospital from a general hospital to which she had been admitted with the diagnosis of hysterical hemichorea, had always been flighty and peculiar. For several years previous to admission she had made no effort to work, but lived on her savings. She complained of numbness in the right hand for two or three years; weakness and tremor of the right arm and leg came on suddenly three months before admission. She had had several slight fainting attacks. On admission she was talkative, hilarious and facetious; her replies were relevant but flippant. She complained of her illness, but was not concerned over it, and showed no insight. She was well oriented for person, place and time; her understanding of surroundings was fair. Remote memory was apparently somewhat impaired; her memory for recent events was good. She would not attempt the educational tests. She had no hallucinations or delusions. She was neat and docile.

Physical Examination. — The face was expressionless. Movements of eyes and tongue were normal. The right pupil was larger than the left; both reacted well. Vision was undisturbed. There was no choked disk. Hearing was normal, and power of speech was intact. The right arm and leg were spastic and atrophic with marked coarse tremor, increased on intention. Knee jerks were increased. Sensation to touch and pain was normal.

Course of Disease. — The patient remained at the hospital for two and a half months. She had alternate periods of drowsiness and exhilaration; during the latter she laughed and talked much of her suffering. She had severe occipital headache. The temperature was continuously subnormal; pulse rate, 80–100; respiration, 20–25. Death occurred suddenly in syncope. No definite diagnosis was made, either at the general hospital or at the hospital for the insane.

Necropsy. — Necropsy revealed a very large cholesteatoma, which had destroyed the anterior half of T1 and T2, the transverse temporals, the lower border of Broca's area, the lower part of the insula, the pyriform lobule, the anterior half of the hippocampus and the subthalamic structures on the left.

Case 2. History. — The second case was an endothelioma involving the anterior part of the right temporal lobe in a woman aged 57. The illness began two years before death with a change of character, the patient becoming moody, suspicious and irritable and showing defective judgment. Weakness of both legs developed into spastic paralysis; she had general convulsions every three or four weeks. In the hospital she had periods of confusion, alternating with comparative clearness, euphoria and facetious-

ness; also episodes of auditory hallucinosis, to which she responded energetically. Dysarthria, double ptosis and conjugate deviation of the eyes to the side of the tumor were noted. This case was complicated anatomically with cerebral arteriosclerosis.

The tumor involving zone 2 has been reported by Fuller.¹⁰ The growth was on the left, sensory aphasia was prominent, and auditory hallucinosis was mentioned. The neurologic signs were divergent squint, exophthalmos and bilateral choked disk.

The third zone was involved in two instances. The symptoms in the first patient, a man of fifty-seven, were nervousness, irritability, insomnia, possibly auditory hallucinosis, right-sided headache, unsteadiness of gait and tremor. The neurologic symptoms were marked exaggeration of all deep reflexes, general increase in muscular tonus, general tremor, right-sided facial spasm and left Babinski reflex. The tumor involved both the third and fourth zones on the right, extending from the tip to the splenium, destroying also the hippocampus, and extending upward, invading the insula and all structures up to the lenticular nucleus.

The second case is taken up in the discussion of tumor in senile patients.

The fourth zone was the site of a tumor in one instance. The patient was an imbecile of fifty-eight, who had deteriorated rapidly in the two years before death. She had olfactory hallucinations, at times calling out continuously, "Oh, that bad smell!" Seven weeks before death she had a convulsion followed by weakness of the right side and involvement of speech. The tumor, a metastasis from a hypernephroma, involved the inferior and mesial surfaces of the left temporal pole.

Each of the cases quoted above presents features of the syndromes of Kennedy, Knapp and Mingazzini, but no one case corresponds closely to any of them.

The only instances of pronounced euphoria in the entire State hospital series are the two temporal tumors mentioned above.

TUMORS OF THE CORPUS CALLOSUM.

The two patients with tumors of the corpus callosum, involving the entire length of the structure, but not limited to it, showed marked mental changes. In the first patient there was increasing slowness of reaction, with somnolence, but his answers were coherent and relevant, and showed comprehension; recent

and remote memory was good, and school knowledge was retained. Paralysis of the legs occurred late in this disease. The tumor infiltrated laterally into the right frontal lobe. In the second patient the first and the predominating symptom was loss of memory, which progressed until a few months before death there was absolutely no immediate retention. The patient was confused and completely disoriented. Two months before death optic aphasia was noted. The tumor swept out laterally into both parieto-occipital regions. In neither of these cases was there involvement of the cranial nerves.

TUMOR OF THE VENTRICLES.

There were four cases in which the tumor (a glioma in each case) was wholly or almost wholly within the lateral or third ventricles. These cases were characterized by profound mental symptoms, in three cases, prominence of the general symptoms of tumor and abundance of neurologic signs. In two cases there was a gradual failure in all mental functions, without active manifestations, and reaching an extreme degree. The third case was complicated by an independent manic-depressive psychosis. The fourth was characterized by increasing lethargy with transient periods of amnesia and confusion, but without true dementia. There was some similarity in the physical signs, the most prominent being unequal pupils, with sluggish reaction to light, in three cases; exaggerated reflexes in three, spasticity in two, tremor in all, and marked ataxia in three cases. Weisenburg, 11 in his article on tumors of the third ventricle, emphasizes the prominence of symptoms of internal hydrocephalus, the marked mental symptoms, the paresis and spasticity, and the ataxia which is present in nearly all cases.

MENTAL SYMPTOMS.

It is fair to assume that because they were sent to hospitals for the insane the patients studied represent a selected group in which mental symptoms were, to the committing physicians, the most prominent feature of the disease.

The predominance of mental symptoms was due, in a part of the group, to a coincident psychosis of one of the common forms. Thirteen of the patients had been recognized as mentally abnormal — either defective or psychotic — before the development of the tumor symptoms. Three were already in hospitals for the insane, and one was committed after operation

for brain tumor. In the other instances the primary psychosis caused the patients to be committed. There were, however, well-developed organic signs in all of the latter cases at the time of entrance. The psychoses represented were: manic depressive, dementia præcox, paranoid condition, senile dementia and alcoholic dementia. In three cases, at least, it seemed to be the development of the tumor that precipitated the active symptoms of the psychosis, and thus necessitated the final commitment.

Excluding the cases in which there was an independent psychosis, with its own characteristic symptoms, and those patients admitted with terminal lethargy and somnolence, in a review of the mental symptoms one is impressed by their undetermined character, the symptoms being most frequently a simple deterioration in all mental functions with apathy, varied occasionally by periods of confusion or slight euphoria. These symptoms occurred with tumors in various situations. Hallucinosis was sometimes mentioned, but was not a prominent feature, except in the temporal lobe tumors. Disturbances of memory were emphasized in the majority of cases; most frequently there was a diminution or even total loss of immediate retention, in other cases, transitory periods of amnesia. The memory disturbances were most extreme in a tumor of the corpus callosum, and in one filling the ventricles and associated with an extreme increase of intracranial pressure. In the temporal tumors, as mentioned above, emotional changes were prominent. No pronounced depressions, and no neurasthenic, hysterical or developed paranoid states, were found.

It appears that this deteriorating tendency which is so prominent in the State hospital group depends not only on the site of the tumor, but is to some extent characteristic of brain tumors in middle life. Of the 20 cases in this group between the ages of forty-five and sixty, with no independent defect or psychosis, 12, or 60 per cent, presented a picture of apathetic deterioration, while of the 9 similar cases below forty-five years, only 3, or $33\frac{1}{3}$ per cent, presented a similar picture (two of them frontal tumors). A psychiatric study of a group of young patients with brain tumor in a general hospital would be valuable to contrast with these mature patients. Of the 4 patients under thirty in the State hospital series, 2 were imbeciles and the other 2 were admitted in the terminal stages of the disease. It is precisely these deteriorating, middle-aged patients who

would gravitate naturally to hospitals for the insane. This explains why the average age of the State hospital patients is greater than that of brain-tumor patients in general.

Schuster goes to considerable lengths in correlating particular mental symptoms with tumors of different regions. We cannot come to any such definite conclusions as he does regarding the association of complex mental reactions with the involvement of certain locations. In fact, the very lack of clear-cut psychiatric pictures is the prominent feature in this series.

BRAIN TUMOR IN THE AGED.

There were three tumors in persons seventy years of age or over, the oldest being eighty-six. Only one patient, a man, aged seventy, an alcoholic for many years, had symptoms referable to the tumor. On admission he was confused, irritable and suspicious. His answers were incoherent and irrelevant. Recent and remote memory was markedly defective, and school knowledge was entirely lost. There was disorientation for time and place. The physical findings were advanced peripheral arteriosclerosis, emphysema, general hyperesthesia, particularly along nerve trunks, exceedingly active knee jerks and fine tremor of the fingers. The patient had convulsions at intervals of a few weeks during his two years' stay in the hospital. first of these began in the right arm and leg, but later they became generalized. He complained first of headache and nausea following the seizures. A year before death aphasia of the motor type appeared with increasing dementia and feebleness. The tumor was a large glioma of the left prefrontal region.

The second case was that of a woman of seventy-two, probably an old dementia præcox, and a hospital inmate for many years. She had had for a long time alternate periods of apathy and extreme excitement, and after one of the latter failed gradually, without special signs or symptoms. The tumor, a glioma, was situated on the under surface of the right temporal lobe, invading also the hippocampus and the pyriform lobule. The brain also showed marked arteriosclerosis with small softenings in the thalamus and the lenticular nuclei.

The third case ran its course as an ordinary senile dementia, complicated with chronic nephritis and arteriosclerosis. Mental failure was said to have begun at seventy-five years. During his nine months' hospital residence the patient was bedridden, quiet, contented and completely disoriented for time and place.

Recent and remote memory was poor, and there was some fabrication. No significant neurologic signs appeared. Failure was gradual. The tumor was a large endothelioma on the orbital surface of the left frontal lobe, protruding into the ventricle. The brain showed the microscopic changes of senile dementia, including plaques.

The reason for the lack of symptoms in some senile brain tumor cases may be that the normal senile brain atrophy lessens the tendency to increased intracranial pressure, and that tumors at this time of life might be expected to grow slowly. In regard to the first point, these senile brains showed flattening of the convolutions only in the vicinity of the tumor, and atrophy elsewhere.

It is obvious that brain tumor patients at State hospitals do not in general offer good prospects for operation, on account of the inaccessibility of the majority of the growths, the late stage of the disease, and the frequent complicating factors, especially arteriosclerosis. Nevertheless, decompressive operations would in many cases have added to the patients' comfort. All patients in State hospitals diagnosed as having or suspected to have brain tumor should be examined by a neurologic surgeon, and the possibility of operation considered.

Conclusions.

Brain tumors occur in general hospitals and in hospitals for the insane with about the same frequency.

The group sent to hospitals for the insane is composed partly (30 per cent) of patients recognized as defective or psychotic before the development of the tumor, and partly of those in whom mental symptoms appear with the tumor.

The average age of patients with brain tumor sent to hospitals for the insane — fifty years — is greater than the age at which brain tumors usually occur; 68 per cent of the cases in these hospitals occur in patients between forty and sixty years.

Frontal tumors predominate, forming 33 per cent of the cases. The majority of patients are admitted in the late stages of the disease, and the condition is diagnosed, even tentatively, in only about 25 per cent of the cases (excluding those admitted to the hospitals with the diagnosis).

The chief reasons for the small proportion of cases diagnosed are that more emphasis is laid on the psychiatric than on the neurologic aspects of the case; that ophthalmoscopic examinations are not made as a routine measure in organic cases; and that, as the majority of the patients are middle-aged or elderly, there are frequently complicating factors, both mental and physical, which would be absent in younger persons.

Cerebral arteriosclerosis is a complication, at least anatomically, in somewhat less than half the cases.

In brain tumor of middle-aged patients committed to hospitals for the insane the usual predominating mental symptoms are simple deterioration and apathy. These were most prominent in the frontal tumors, but were present also in those of other areas, with the exception of the temporal tumors, in which the symptoms were more active and varied. This tendency to deterioration appears to be especially characteristic of brain tumors in middle age.

The development of a brain tumor may be the factor which determines the onset of an independent psychosis in a predisposed person.

In old age, brain tumors may reach a large size without giving characteristic signs or symptoms. The reasons for the atypical course appear to be the senile brain atrophy counterbalancing the tendency to increased intracranial pressure, and the probable slow growth of the tumor at this age.

It is earnestly urged that the possibility of brain tumor be more frequently considered in insane patients; that ophthalmoscopic examinations be made in all atypical organic cases; and that when brain tumor is diagnosed, the question of at least a decompressive operation be considered.

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THE USE OF THE THERMOMETER IN MENTAL DISEASES.

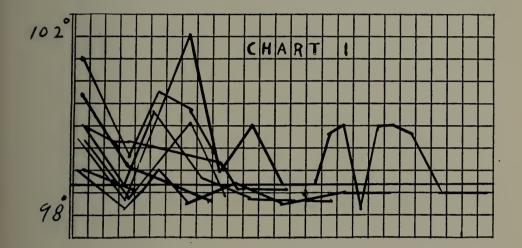
By E. D. Bond, M.D., PHILADELPHIA, PA.,

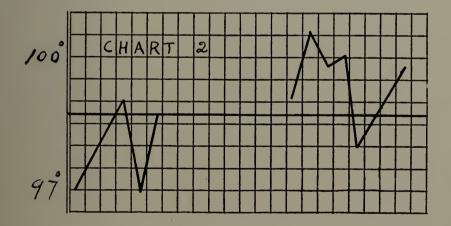
MEDICAL DIRECTOR, DEPARTMENT FOR MENTAL AND NERVOUS DISEASES, PENNSYL-VANIA HOSPITAL.

Not long ago the thermometer was considered of no value in mental diseases. There was a tradition that the insane never got fevers. At present there is recognition of the importance of temperature records among the insane, but not enough. The general practitioner, if he meets the mental symptoms of the case first, seems to forget all about his thermometer and stethoscope. Even on the chronic wards of the hospitals for the insane, I suspect that more fevers would be shown if records were made more as a routine, and also if it did not take so much time and trouble to get records upon disturbed and resistive patients. On an admission ward, however, fevers occur frequently, and here and in the practice of the psychiatrist are to be found the opportunities for the further study of the relation of increased bodily heat to mental diseases.

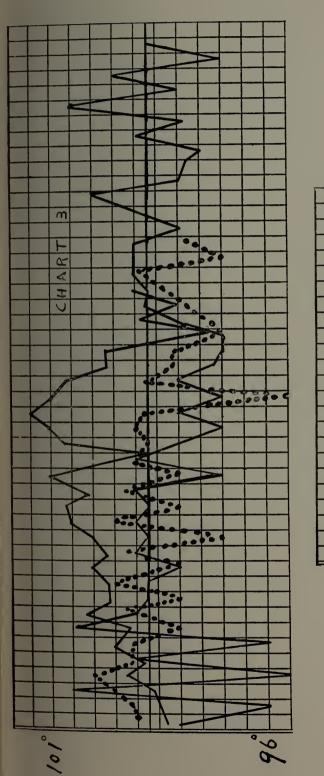
From Jan. 1, 1916, to the first week in July, 71 women were admitted to the Department for Mental and Nervous Diseases of the Pennsylvania Hospital. Fevers slight or severe, transitory or chronic, occurred in over 50 per cent, a surprising result for consecutive cases. Undoubtedly selection has had some part in determining this percentage, physicians perhaps tending to send deliria of certain grades to us, and the hospital making certain discriminations in favor of acute cases. The diagnoses, however, are sufficiently varied and show that fever has occurred in imbecility, epilepsy, arteriosclerotic dementia, general paralysis, dementia præcox and manic-depressive psychoses. Of 19 cases of manic-depressive insanity, 13 had fever and 6 did not. Of 19 cases of dementia præcox 8 had fever and 11 did not, this being the only disease in which normal temperatures were found more often than the reverse.

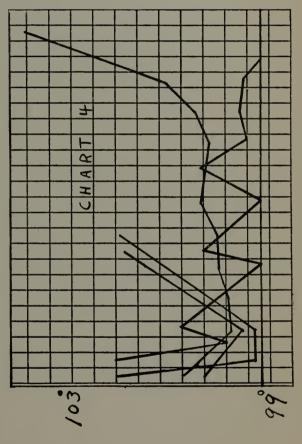
This paper is an examination of the temperature charts found in these consecutive cases, singly and in groups. We have first a group of several initial fevers of from two to three degrees, subsiding to normal in from one to eight days. This group is shown in composite on chart 1. We can see that such initial



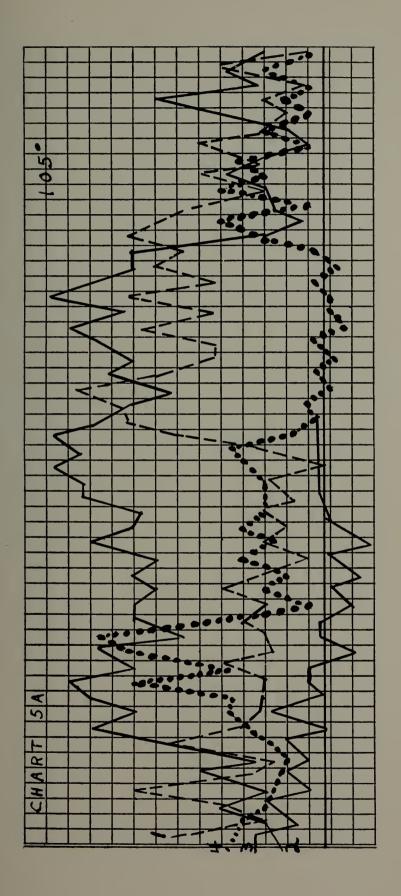


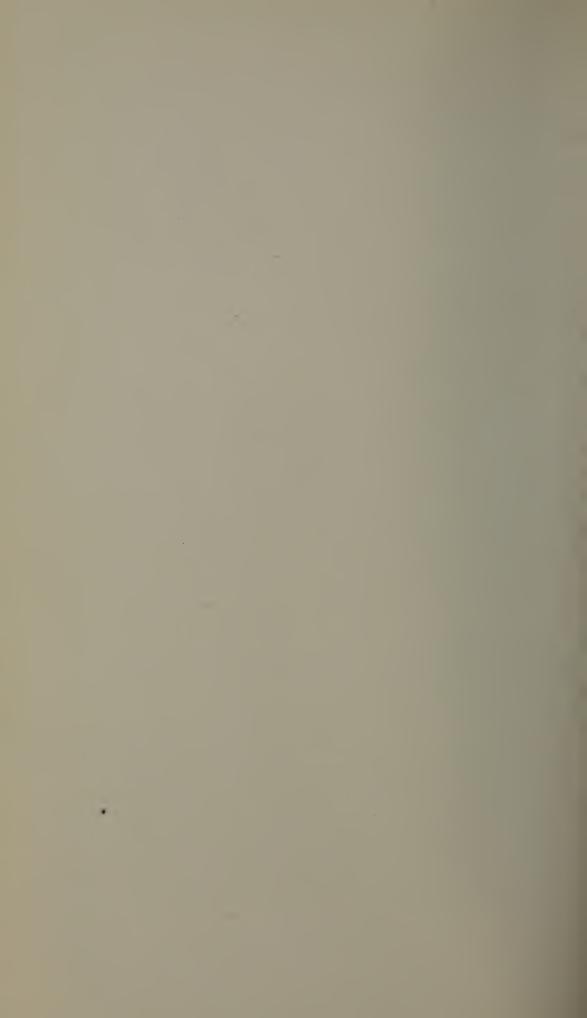


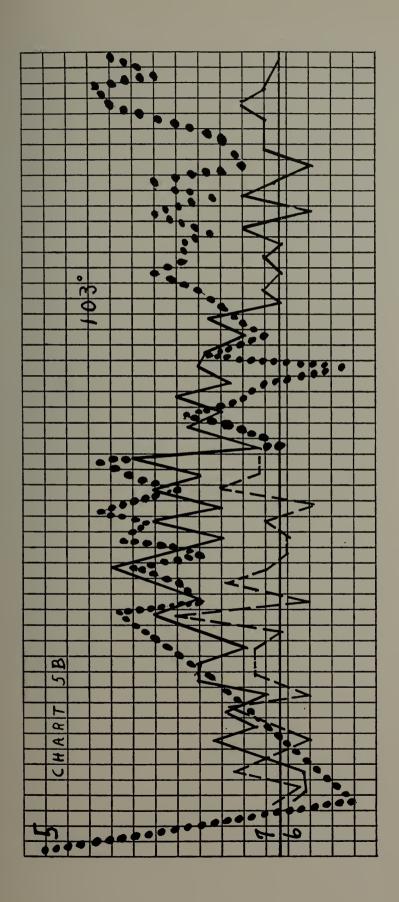




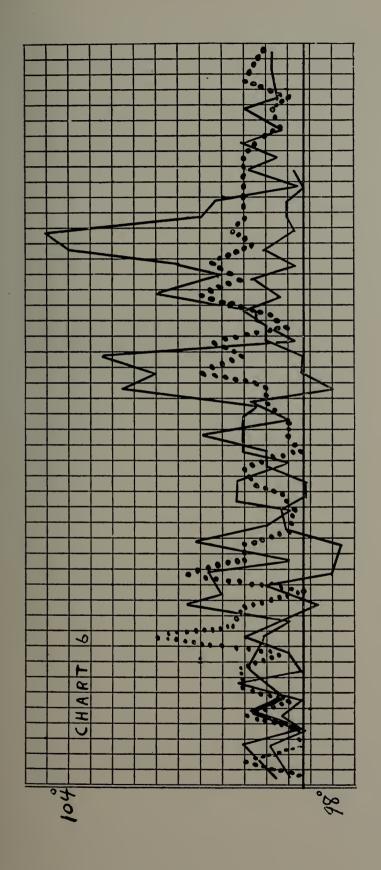


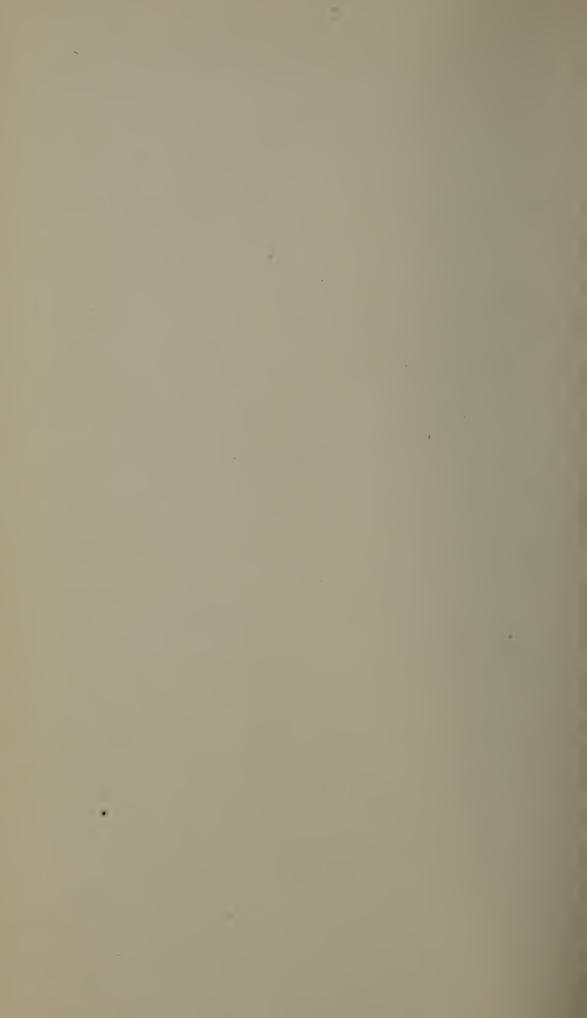












temperatures have little meaning for the mental disease. A drop to normal coincides with the coming of the patient under control, after the family, with insufficient advice and help, has allowed the patient to become constipated, or superficially infected from dirty teeth, nails or skin. Noticing the fever, however, is of value in emphasizing the need of immediate treatment; while such conditions undoubtedly mean little if treated, they may mean much if neglected.

It has been our custom, after getting the temperature to the normal line for a few days, to discontinue the chart to the time when clinical indications arise for renewing it. In certain cases, however, we have picked up fevers by taking records without such clinical indications. Such a record as chart 2 shows what happens sometimes, and suggests that the routine use of the thermometer should continue at least through the first menstrual period. The use of the full monthly page of the average temperature chart, even with continued normal findings, seems justified as a routine measure.

A group of three long-continued temperatures in general paralysis cases is shown in chart 3.

Illustrations of fever in all sorts and conditions of defect and disease are supplied freely in the remaining cases; in an imbecile, for instance, at the menstrual period, and in five cases of gross cerebral damage (chart 4).

I' turn now to a group of seven cases, the first of which is undoubtedly to be classified as an infective psychosis, and the last as a true manic state. It is the sequence of these cases that I wish to emphasize, with special reference to the physical factors at the onset and the gradual changes in intensity and number of certain, often recurring, symptoms.

A short account of each of these cases is needed and will be found below, while the fever line is given in chart 5 A and B with the appropriate number. The following characteristics for the whole group may be mentioned: This was the first attack for all cases, except the last; the ages at onset ranged from twenty-six to forty-nine; the Wassermann reaction was negative for all seven cases, although the fourth case had had syphilis three years ago, followed by thorough treatment; none of the cases used alcohol

NONCONCOMITANCE OF SPINAL FLUID TESTS.*

By H. C. Solomon, M.D., Boston.

Tests applied to Spinal Fluid in Diagnosis of Disease of Central Nervous System.

There are five laboratory tests commonly applied to the spinal fluid in the diagnosis of disease of the central nervous system, namely: (1) Wassermann reaction; (2) test for globulin; (3) test for increased albumin; (4) cell count (increase called pleocytosis); (5) Lange's colloidal gold test. A positive Wassermann reaction in the spinal fluid is practically specific for neurosyphilis. A positive result in the other tests, in a general way, proves a pathologic reaction of an inflammatory nature in the central nervous system. At any rate, where an inflammatory condition of the nervous system exists tests 2, 3, 4 and 5 are usually positive. In other words, in meningitis, encephalitis, tumor with meningitis sympathica, vascular insults with secondary inflammatory reaction, traumatic injury and multiple sclerosis these four tests are generally positive. In paretic or tabetic neurosyphilis all five are usually positive.

The subject of this paper is the consideration of the relation of these tests one to the other, the identity or non-identity of one to the other, and their independent appearance and disappearance in disease conditions. There are three methods of study applicable to this problem: (a) chemical and biologic analysis of the substances; (b) review of the spinal fluids obtained from a large series of cases with attention to anomalous or unusual relations or non-relations of findings; (c) frequent examination of fluids from cases of neurosyphilis undergoing treatment, and in which the spinal fluid findings are influenced in the process of improvement.

Wassermann Test.

The Wassermann reaction in the spinal fluid is a biologic reaction pathognomonic of syphilis of the nervous system. As a rule, when present it indicates an inflammatory change in the nervous system, but occasionally it is positive, when the involvement is chiefly vascular and not inflammatory. The so-called

^{*} From the Massachusetts State Psychiatric Institute, Boston. A paper presented to Dr. E. E. Southard, in honor of the decennial of the Bullard Professorship of Neuropathology at the Harvard Medical School.

Wassermann bodies, whatever that substance is which produces deviation of complement, is an unknown element. evidence to show that it is related to the albuminous content of the blood serum, and by analogy, therefore, to the albuminous content of the spinal fluid. Thus Bruck has shown that an albumin reaction occurs in many cases, giving a positive Wassermann reaction which is different from that obtained in Wassermann negative cases. Weston showed that the Wassermannproducing substance does not pass through a dialyzing thimble which is impermeable to albumin. In some unpublished work at our laboratory we have shown that the addition of pure globulin to a spinal fluid giving a negative Wassermann reaction will cause the reaction to become positive. However, these bits of evidence are far from conclusive that the Wassermannproducing body is contained in the albumin, and there is evidence, such as that brought forth by McDonagh, that it is a lipoid element with which the Wassermann reaction is associated. The evidence we bring in the body of this paper is against the relation of the Wassermann reaction to globulin or albumin.

It is, of course, evident that there is no relation between the Wassermann reaction and pleocytosis. Pleocytosis is evidence of inflammation, the Wassermann reaction of syphilis. Even where the inflammation is of syphilitic origin, the Wassermann reaction may be negative in the presence of a pleocytosis, or, what is much more common, the pleocytosis may be absent with a positive Wassermann.

TEST FOR GLOBULIN.

Globulin by definition is an albumin which is salted out of solution by half saturation with ammonium sulphate. Globulin does not occur normally in the spinal fluid. When present it is an evidence of pathology, and it is usually considered as proof of an inflammatory type of reaction. It also may be present, however, when there has been seepage of blood into the spinal fluid through a hemorrhage or vessel changes. If globulin is present in the spinal fluid, theoretically it means that there is an increase in the total amount of albumin, as this is an addition of an albuminous substance to the albumin normally present. As albumin which is precipitated by an acid such as trichloracetic is normally present in the spinal fluid in small amounts, it is increased in amount whenever globulin is present. However, it is not dependent for its increase solely on globulin, but is increased as a result of inflammation. While we have mentioned that increased globulin cannot exist without a theoretic increase

in the amount of albumin, albumin can be present in increased amount without the presence of globulin. We will later show that this actually occurs. While, again, the globulin, albumin and pleocytosis are evidence of inflammation, it does not follow à priori that they are dependent one on the other or must be present together. They are quite different elements. The same is true of the Wassermann in relation to globulin and albumin.

COLLOIDAL GOLD TEST.

The chemical nature of the substance which produces the colloidal gold reaction is not clearly defined. The colloidal gold reaction is a method of differentiating albumins, and was used by Lange in the endeavor to classify the type of globulin occurring in the spinal fluid. Without having succeeded in making this classification, he did discover this practical test. obvious assumption is that the test is dependent on the albumins or globulins in the spinal fluid. It is probable that the actual type of reaction obtained is dependent to some extent on the balance of globulin and albumin present in the fluid. However, it seems to be a fact that it is not the globulin ordinarily present that causes the precipitation of the gold. Matskiewitsch attempted to identify the substance causing the colloidal gold reaction as peptone. Weston disagrees with this finding. Our clinical experience has shown that the gold reaction may be obtained with a fluid that gives no precipitation with half saturated ammonium sulphate.

Our assumption in this consideration is that these substances may appear independently one of the other, and that while, on the whole, they represent reaction substances of inflammation, they are in some respects entirely different responses.

SPINAL FLUID FINDINGS.

Now if this be so, that these substances may occur independently one of the other (with the one exception that globulin means an increase of albumin), it would follow that a number of combinations can occur, and as a matter of fact do occur. Our evidence is derived from two sources, — the routine examination of several thousand fluids, and examination of spinal fluids from cases of neurosyphilis undergoing treatment.

From the first group are obtained instances of the independent appearance of the several elements, and their appearance in various combinations. From the cases under treatment one finds that one test or another disappears first, and finally only one may be left positive. The different combinations appearing in these two groups are shown in the accompanying table.

Brief examples may be given of the reactions occurring in group 1. The Wassermann reaction occurs independently of other tests, not infrequently in the endarteritic forms of cerebral syphilis. It occasionally is found as the only positive test in cases of congenital syphilis, tabes and diffuse neurosyphilis. On the other hand, we have seen cases in which it was the only test to be absent. This, of course, is always true in non-syphilitic inflammatory conditions giving a positive reaction for the other tests. We have also seen it even in cases of general paresis, tabes and congenital syphilis.

Results of Spinal Fluid Tests.

Spinal Fluid Finding.	Condition in which this Finding occurred (Untreated Cases).	Findings occurring in Treated Cases of Neurosyphilis.
Pleocytosis.	Congenital syphilis, undiag- nosed mental disease.	
Albumin.	Trauma, Korsakoff's psychosis, undiagnosed mental dis-	
Wassermann reaction.	vascular neurosyphilis, con-	General paresis.
Colloidal gold, test.	genital syphilis. Undiagnosed condition.	General paresis, tabes, etc.
Pleocytosis and albumin.		etc.
Pleocytosis and Wassermann reaction.		General paresis, cerebrospinal syphilis.
Pleocytosis and colloidal gold test.		General paresis.
Globulin and albumin.	Cerebrospinal syphilis, trauma, cerebral hemor- rhage, brain tumor, chronic alcoholism.	General paresis.
Albumin and Wassermann reaction.		
Wassermann reaction and colloidal gold test.		General paresis.
Albumin and colloidal gold test.	Undiagnosed mental disease.	Cerebrospinal syphilis.
Pleocytosis, globulin and albumin.		
Pleocytosis, albumin, Wassermann reaction. Pleocytosis, albumin, colloidal gold test.	Cerebrospinal syphilis.	General paresis.
Pleocytosis, Wassermann reaction, colloidal gold test.	Neurosyphilis.	
Globulin, albumin and Wassermann reaction.		General paresis, cerebrospinal syphilis.
Globulin, albumin and colloidal gold test. Albumin, Wassermann reaction and	Multiple sclerosis.	Tabes, cerebrospinal syphilis.
colloidal gold test. Pleocytosis, globulin, albumin and		
Wassermann reaction. Pleocytosis, albumin, colloidal gold test		General paresis.
and Wassermann reaction. Pleocytosis, globulin and colloidal gold	Multiple sclerosis, brain tu-	General paresis.
test. Globulin, albumin, Wassermann reac-	mor, apoplexy. General paresis, cerebrospinal	General paresis.
tion and colloidal gold test. Pleocytosis, globulin, albumin, Wasser- mann reaction and colloidal gold test.	syphilis. General paresis, tabes, cerebrospinal syphilis.	General paresis, tabes, etc.

Pleocytosis is the most variable of the abnormal findings. It is not infrequently absent in the chronic inflammatory processes; e.g., in general paresis, tabes, brain tumor and multiple sclerosis, when the other tests are positive. On the other hand, it may be present in the absence of all other tests. For example, a woman suffering from glycosuria and a mild depression showed 12 cells per cubic millimeter; a second puncture showed 16 cells per cubic millimeter. Her husband was a tabetic. A second example is that of a twenty-year-old boy with all the signs of congenital syphilis, with outbreaks of violence, confusion and amnesia. He showed 56 cells per cubic millimeter, the other spinal fluid reactions being negative.

An increased amount of albumin as the only abnormal finding is not infrequent. In many instances where one finds this as the only evidence of pathology, one is at a loss to be able to interpret it, and we have seen frequent examples of this sort in dementia præcox and unclassified psychoses. According to Myerson an increased amount of albumin is common in Korsakoff's psychosis. I have been able to confirm this in a very small minority of Korsakoff cases. It also occurs after fractured skull and after fairly recent hemorrhage.

The gold reaction may occasionally be found as the only positive test, though this has been quite rare in our experience. We have found it in a few psychotic cases in which we were unable to explain its significance and in a few cases of syphilis.

It seems unnecessary to go into detail as to the combination of these findings with their clinical significance. It suffices to indicate on the table in what conditions we have found these to occur.

In cases of neurosyphilis receiving intensive antisyphilitic treatment, there usually is a change in the laboratory tests. We find that there is no general rule as to which test is the first to become weakened or to disappear, or as to which will remain positive. As one would expect, they do not all change at identically the same time. Thus in cases of general paresis undergoing treatment the Wassermann reaction is frequently unchanged despite long and intensive arsenic and mercury injections, and may remain positive after all other tests have become normal. In another case, with the same diagnosis and similar spinal fluid findings before treatment, the Wassermann reaction may be the first test to become negative. The same variation is to be found with the colloidal gold test, globulin and albumin.

In the table (third column) we have indicated the combination of findings that we have seen in treated neurosyphilitic cases. In addition a few examples are given in more detail.

REPORT OF CASES.

Observation 1. Wassermann Reaction remained Positive; all Other Tests became Negative. — Woman, 57 years of age, diagnosed as a case of general paresis.

Before treatment: Wassermann reaction +; globulin + + +; albumin + + +; cells 22 per c.mm.; colloidal gold test, general paresis.

After treatment: Wassermann reaction +; globulin 0; albumin negative; cells 0 per c.mm.; colloidal gold test, negative.

Observation 2. Colloidal Gold Test remained Positive; all Other Tests became Normal. — Diagnosis: General paresis.

Before treatment: Wassermann reaction +; globulin + +; Albumin + +; cells 37 per c.mm.; colloidal gold test, general paresis.

After treatment: Wassermann reaction —; globulin 0; albumin negative; cells 3 per c.mm.; colloidal gold test, general paresis.

Observation 3. Pleocytosis and Wassermann Reaction remained Positive; Other Tests Negative. — The patient was a man of 35 with numerous neurasthenoid complaints, blood and spinal fluid positive to all tests. After two years of treatment spinal fluid findings were: Wassermann reaction +; globulin 0; albumin negative; cells 110 per c.mm.; colloidal gold test negative.

Observation 4. Globulin and Albumin remained Positive; Other Tests Negative. — Diagnosis: General paresis.

Before treatment: Wassermann reaction +; globulin + +; albumin + +; cells 90 per c.mm.; colloidal gold test 5555553000.

After treatment: Wassermann reaction—; globulin + +; albumin + +; cells 3 per c.mm.; colloidal gold test negative.

Observation 5. Colloidal Gold Test and Wassermann Reaction remained Positive; Other Tests became Negative. — Diagnosis: General paresis.

Before treatment: Wassermann reaction +; globulin + +; albumin + +; cells 22 per c.mm.; colloidal gold test, general paresis.

After treatment: Wassermann reaction +; globulin 0; albumin negative; cells 0 per c.mm.; colloidal gold test, general paresis.

Observation 6. Albumin and Colloidal Gold Test remained Positive; Other Tests became Negative. — Diagnosis: Cerebrospinal syphilis.

Before treatment: Wassermann reaction +; globulin + + +; albumin + + +; cells 11 per c.mm.; colloidal gold test 5432210000.

After treatment: Wassermann reaction negative; globulin 0; albumin +; cells 3 per c.mm.; colloidal gold test 0134310000.

Observation 7. Globulin, Albumin and Wassermann Reaction remained Positive; Pleocytosis and Colloidal Gold Test became Negative. — Diagnosis: General paresis.

Before treatment: Wassermann reaction +; globulin + +; albumin + +; cells 45 per c.mm.; colloidal gold test 5555555200.

After treatment: Wassermann reaction +; globulin ++; albumin + +; cells 4 per c.mm.; colloidal gold test negative.

Observation 8. Globulin, Albumin and Colloidal Gold Test remained Positive; Wassermann Reaction and Pleocytosis became Negative. — Diagnosis: Cerebrospinal syphilis.

Before treatment: Wassermann reaction +; globulin + +; albumin + + +; cells 56 per c.mm.; colloidal gold test, 0013321000.

After treatment: Wassermann reaction negative, globulin +; albumin +; cells 0 per c.mm.; colloidal gold test 2223310000.

Observation 9. Wassermann Reaction became Negative; Other Tests remained Positive. — Diagnosis: Cerebrospinal syphilis.

Before treatment: Wassermann reaction +; globulin + + +; albumin + + +; cells 41 per c.mm.; colloidal gold test, general paresis.

After treatment: Wassermann reaction—; globulin ++; albumin ++; cells 9 per c.mm.; colloidal gold test, syphilitic.

Observation 10. Pleocytosis reduced to Normal; Other Tests remained Negative. — This is a very frequent finding.

Even though not a part of this discussion, we would like to add that the Wassermann reaction in the blood serum varies independently of the spinal fluid findings. Thus it may become negative while all the spinal fluid tests remain unchanged, or it may remain positive when all the spinal fluid tests become negative. It is also pertinent to note that the changes in these spinal fluid tests do not always parallel clinical changes in the patients. Thus we have seen illustrations where although the tests became negative the symptoms were in no way improved; and on the other hand, where there was marked symptomatic improvement without any change in the tests.

SUMMARY.

Of the five spinal fluid laboratory tests commonly used, only cells and albumin are normal constituents of the fluid, and the excess amounts of these are evidence of pathology. The Wassermann reaction is for practical purposes specific for syphilis of the nervous system. Pleocytosis, globulin, albumin and colloidal gold reaction are generally indicative of an inflammatory reaction of brain, cord or meninges. These tests may be positive owing to infection, mechanical injury, tumor, trauma, vascular insults, multiple sclerosis, etc. As a rule, globulin, albumin increase, pleocytosis and a positive colloidal gold reaction occur together,

and when the Wassermann reaction is positive, it is usual for the other four to be positive also. Although usually present together, and in a general way indicative of the same pathologic condition, each reaction is produced by a distinct chemical element which may be present alone (except that theoretically globulin means an increase in the total amount of albumin, as globulin is a special albumin). Thus one may find the Wassermann reaction positive, all other tests negative, a positive colloidal gold reaction as the only positive finding, only a pleocytosis or merely an albumin increase. Further, they may occur in various combinations. This is theoretically possible on the basis of difference in chemical constitution, and it is shown in this paper that this actually does occur.

Additional evidence of the independence of each element is offered in the result of treatment of cases of neurosyphilis. Starting with all tests positive, it is shown that they become negative, often one at a time, and the different combinations are left positive, or only one is left positive.

Conclusions.

- 1. There is a nonconcomitancy of the inflammatory elements of the spinal fluid commonly tested for in diagnosis of disease of the central nervous system.
- 2. Any one may be present or absent when the others are present, with the exception that globulin presages an increased amount of albumin.
- 3. No spinal fluid can be considered negative in which all these tests have not been used.
- 4. No one element tested for contains the element or fraction that gives another test, except that the total albumin contains the globulin fraction, in part at least.
- 5. In neurosyphilitic cases receiving treatment these substances disappear at differing rates which vary in different cases, so that no general law can be laid down as to which element is most easily affected by treatment in any particular case, though in general the pleocytosis disappears first.
- 6. The presence or absence of these products of inflammatory reaction does not always parallel the clinical change in the treated neurosyphilitic patient.

A NOTE ON A CERTAIN ANOMALY OF GYRATION IN BRAINS OF THE INSANE.*

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Influenced by Southard's work on anomalies and scleroses in brains of the insane, especially from cases of dementia præcox, the writer early in his service as pathologist at Danvers began to search for such alterations in all brains coming into his hands.

Attention soon became focused on a frequently occurring anomaly, which at first appeared to be found only in brains from cases of manic-depressive psychosis and dementia præcox.

This anomaly was described in terms of "gyral interruption," and it was only recently learned that the same type of anomaly has been described in terms of continuity of fissures by Benedikt, and described (though not always as anomaly) by many authors, including Retzius, Turner, Schuster and others.

Up to the present, attention has been fixed on the central fissure and the pre-central and post-central gyri. The plan is eventually to extend the study to all gyri through the medium of a series of photographs made under standard conditions of 100 unselected brains.

The anomaly may be described briefly as follows: Normally the central fissure does not connect with any other fissure. It is shut off from the Sylvian fissure by a bar of cortex which connects the pre-central and post-central gyri. The pre-central and post-central gyri are normally continuous, and this effectively prevents other sulci communicating with the central fissure. In the anomalous cases a fissure cuts through either the pre-central or the post-central gyrus, most commonly the former, and runs into the central fissure. I have not, so far, completely analyzed all cases to determine the number in which the central fissure runs into the Sylvian fissure. This note concerns those cases in which an interruption of either pre-central or post-central gyrus occurred.

^{*} No. 66, Danvers State Hospital Papers; contributed to a series in celebration of the tenth anniversary of the Bullard Professorship of Neuropathology, Harvard Medical School.

I have presented in Figs. 1, 2 and 3 some photographs of brains which show the anomaly. Fig. 1 shows a brain in which there were interruptions of both pre-central gyri and in which the central fissure runs into the Sylvian fissure. Fig. 2 shows an interruption of the left pre-central gyrus, the central sulcus communicating with the Sylvian fissure, a less marked interruption of the post-central gyrus, and an interruption of the right pre-central gyrus. Fig. 3 shows an interruption of the left post-central gyrus, this being the only one of four gyri interrupted. This also shows another common finding in this type of case, namely, the tendency to the formation of three or more "ascending" gyri instead of two.

Table I. — Interruptions — 100 Brains.

	DIAG	GNOSI	es.				Number of Cases.	With Interruptions.
Paresis,							27	12
Senile dementia,							13	8
Arteriosclerosis, .							9	2
Organic,							3	3
Toxic,							8	3
Miscellaneous, .				•		•	3	0
Dementia præcox,		. •					17	16
Manic depressive,							15	14
Imbecile,							2	2
Paranoia,							1	1
Presenile delusional,							1	1
Epilepsy,							1	1

The material for this study consists of 100 unselected psychotic cases autopsied at Danvers Hospital. After somewhat detailed study in the gross, the brains were photographed when hardened in formalin. The series of photographs for each brain was as follows: The vertex and base were photographed with pia intact; then the pia was stripped and the following photographs made: vertex, base, lateral and mesial surfaces of right and left hemispheres; three plates of sections of the cerebrum; and one plate of sections of the cerebellum. All photographs were made under standard conditions, and the magnification is

the same in each brain for each view. Thus there is a slight difference in the magnification of the vertex and of the hemispheres. This difference is not, however, very great.

In Table I will be found the distribution by diagnosis of the cases autopsied, and the number of cases in each group in which interruption of either pre-central or post-central gyri was observed.

It will be seen that there were 63 cases in the groups that are not necessarily hereditary and having a more or less definite pathology. Among these 63 cases 28 showed interruptions of one or more gyri. I have used this group of cases as my standard of comparison with the groups in which the psychosis might be regarded as inherent or functional, or due to neural instability or lack of development. In other words, I have regarded these cases somewhat in the light of a normal series.

Table II. — Insane Heredity.

	DIA	GNO	SES.			Insane Heredity (Per Cent).	Unknown.	Negative (Per Cent).
Paresis,						17	-	83
Senile dementia,						-	66	34
Senile dementia plu	ıs ar	t, .				50	-	50
Arteriosclerotic,		٠.				100	-	-
Organic,						33	67	-
Toxic,						33	-	67
Dementia præcox,						, 42	33	25
Manic depressive,						67	22	11

When we turn to so-called functional psychosis (dementia præcox, etc.), we find that out of 37 cases 35 show the anomaly. In other words, about 44 per cent of the group that might be called organic or extraneous psychoses show the anomaly; practically 95 per cent of the functional or endogenous psychoses show it. In order to determine whether or not the anomaly might be regarded as an evidence of hereditary neural instability, we have investigated the heredity of the cases showing interruptions. These results are presented in Table II.

The facts are somewhat uneven, but they do demonstrate that insane heredity had played an important part in only two groups of cases, namely, the arteriosclerotic and manic-depressive.

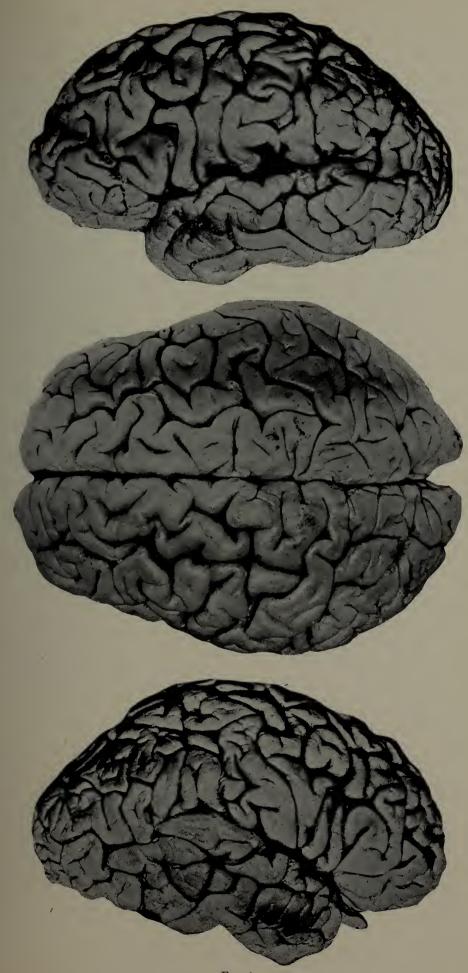


Fig .1.



PLATE II.



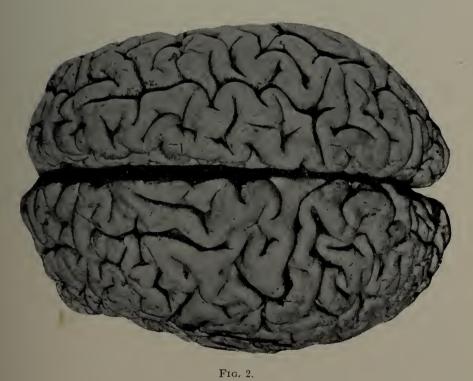
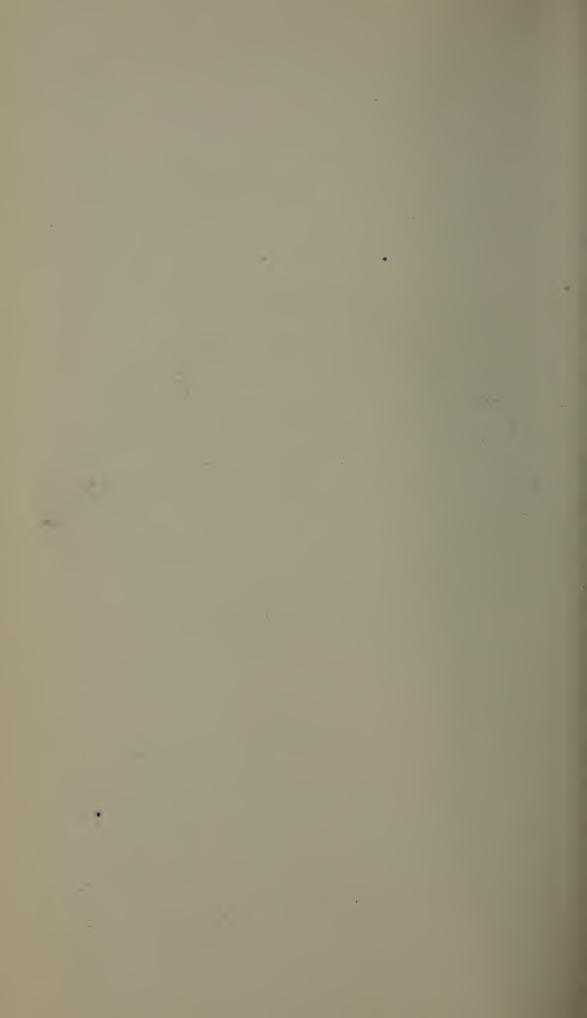




PLATE III.



Fig. 3.



The importance of this anomaly is thought to be as follows: the fact that it does occur is some evidence of a loosely organized nervous system. The anomaly is easy to find, and serves as an index of the organization of the brain, and I believe that careful study of this and similar anomalies represents a step in advance in the cerebral pathology of the mental diseases. I do not, of course, believe that it has any direct or causal relationship to the symptoms of the psychosis.

THE LEUKOCYTIC REACTION IN A PARATYPHOID DYSENTERY AND FOLLOWING VACCINE INOCULATIONS.*

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The occasion of this report was a dysentery which appeared as an epidemic ¹ in 1915 in the Boston State Hospital. The organism which caused the disease belonged to the paratyphoid enteritidis group, but could not be identified with any of the well-known members. Clinically, the disease appeared in three forms, — a dysenteric-pneumonic, a dysenteric and a diarrheal. The duration of the disease was from five days to three weeks. The majority of the cases occurred among the old and feeble women patients in the infirmary department.

The 22 blood examinations in the table (I) represent 12 severe cases. The blood picture varied somewhat in different patients and in the same patient during the course of the disease. The total white counts were between 5,100 and 13,300. ential count was not quite so variable as the total count, in that it remained more constant to the form of the disease. The per cent of polynuclears was relatively higher and that of the lymphocytes lower in the pneumonic than in the pure dysenteric form. In the dysenteric cases uncomplicated with pneumonia, the lymphocytes persisted rather high during the first two weeks, - between 27 and 40 per cent; in two recovered pneumonic cases the lymphocytes showed a high per cent in the third week during convalescence, - 37 and 43 per cent. A count made in one case of an acute arthritis following a short severe attack of dysentery resembled the pneumonic cases. Eosinophiles were not found in any case during the first week; in the second week they reappeared in 5 to 2 per cent. Transitionals gave a higher per cent in the first than in the second week. In all cases blood platelets were much increased throughout the disease and in early convalescence. There was no evidence of an anemia, judging from the hemoglobin per cent and the character of the red blood cells.

Reports of blood examinations in paratyphoid infections have not been numerous, but a review of them shows either a normal

^{*} This is one of a series of fifteen papers (269, 1919.12) offered to Prof. E. E. Southard in honor of the decennium of the Bullard Professorship of Neuropathology, Harvard Medical School.

picture or changes in the white blood cells similar to those in typhoid fever. Uhlenroth and Hubener ² state that there may be a leukopenia in the typhoid form of a paratyphoid B infection, with an early loss of eosinophiles and a late relative increase in lymphocytes, quite like a true typhoid. In a paratyphoid A ³

Table I. — The Leukocytes in a Paratyphoid Dysentery.

Case.	Day.	Total.	Poly.	Lymph.	Trans. L. M.	Eosin.	Bas.	Remarks.
R. W.,	1	6,400	66	29	4.75	-	. 25	T. 104.8°.
M. G., : .	2	6,400	56	29	15	-	-	T. 102.8°.
E. O'M.,	3	13,100	68	31	1	-	-	Pneumonic.
E. O'B.,	3	5,400	5 9	27	14	-	-	
A. S.,	4	5,100	77	13	10	-	-	Pneumonic. Death 5th
M. C.,	4	-	54	40	6	_	-	day.
E. O'B.,	5	-	59	33	8	-	-	
M. C.,	6	12,800	66	30	4	-	-	
E. M'K.,	6	12,200	76	10	14	-	-	Pneumonic.
M. P.,	7	-	72	19	8	-	-	Pneumonic. Death 11th
M. W.,	8	_	53	41	4.5	.5	-	day.
J. C.,	. 9	-	80	13	2	.5	-	Pneumonic.
J. M.,	10	8,800	63	25	6	2	1	Convalescent.
M. G.,	13	-	64.5	30	5	.5	-	
M. C.,	14	10,000	62	34	3	-	1	
E. O'B.,	15	8,000	65	31	3	.5	-	Convalescent.
E. M'K.,	17	-	59	37	3.5	.5	-	Protracted case.
E. O'B.,	18	-	65	26	2	7	-	Convalescent.
T. S.,	18	10,000	71	23.5	3.5	1.5	.5	T. 101°. Acute arthritis.
M. W.,	18	-	63	33	1	3	-	Convalescent.
J. C.,	19	-	52	43	4	.5	-	Convalescent.
M. G.,	23	8,200	65.5	25	9	. 5	-	Convalescent.

infection of typhoid form in this hospital in 1910, blood examinations showed total leukocyte counts between 3,200 and 8,000, with the lowest count on the fourth day. The lymphocytes showed a relative increase on the fourth day, and the eosinophiles, although not entirely disappearing, were reduced on the third day. Rolly,⁴ in 1911, reported total leukocyte counts made in about 35 cases of paratyphoid A and B infections of the para-

typhoid form. In the B infections the counts were between 3,000 and 7,000, not apparently decreasing with the progress of the disease. In one case of paratyphoid A infection, six counts made between the twelfth and the twenty-second day fluctuated between 3,800 and 6,400. One of the cases of paratyphoid B is of interest in the light of our findings. This patient had a double pneumonia on the thirteenth day, with a count of 17,000, falling to 6,200 on the twenty-fourth day, with an improvement in the lung condition. Rolly questioned whether the pneumonia may not have been due to a mixed infection. Hall and Adam 5 in the present European war have studied blood smears from soldiers convalescent from dysenteries, typhoid fever and paratyphoid A and B infections. They observed a relative lymphocytosis with a low polynuclear per cent following both typhoid fever and a paratyphoid A infection up to the thirteenth week. that from the Mediterranean area all convalescents from a paratyphoid A infection showed a normally high polynuclear per cent indicated to the writers that these patients may have suffered from another form of dysentery, amæbic or bacillary, at the same They did not explain the normal polynuclear per cent found in all convalescents from a paratyphoid B infection, nor did they mention the clinical form of the disease. Ordway,6 in an experimental study of rabbits suffering from a typhoid-like disease caused by the bacillus suipestifer, observed that the total white blood counts were not altered by the infection.

In this epidemic dysentery the one persistent similarity to a typhoid picture was the loss of eosinophiles during the first week. It is probable that the increase in polynuclears in some cases was related to the pneumonic process. In two septicemic pneumonic cases that came to autopsy, the paratyphoid bacillus was found in the lung lesions associated with a streptococcus in one case and a staphylococcus in the other. We have not sufficient data to say whether higher counts are more usual in a dysenteric than in a typhoid form of a paratyphoid infection.

THE LEUKOCYTIC REACTION FOLLOWING VACCINE INOCULATIONS.

Gay and Claypole ⁷ in their experiments in typhoid immunization found that a specific hyperleukocytosis, preceded by a leukopenia was produced in typhoid immune rabbits by inoculations with typhoid vaccine, and that the increase in cells was due to the polymorphonuclear. The leukocytic response was more rapid and rose to a greater height in the immunized rabbit

than in the normal animal. H. I. McWilliams,⁸ in a more recent report of similar experiments with rabbits, noted a hyperleukocytosis which was not of a higher grade in the immune than in the non-immune animal.

Both Gay 9 and McWilliams 10 have described the leukocytic reaction following injections of vaccine in typhoid fever. A chill and rise in temperature are coincident with a leukopenia shortly after the inoculation, and a few hours later, with the lowering of the temperature and a lessening of symptoms, there is a high-grade hyperleukocytosis. The relation of the hyperleukocytosis or "leukocytic crisis" to the freeing of the antibodies indicates the possible value of these studies in vaccine therapy and prophylactic immunization. Although the blood examinations in this paratyphoid dysentery have been limited to human cases, and have not the exactness of results obtained in animal experimentation, they have a certain clinical value because it has been possible to observe these cases over a number of months.

A polymorphonuclear leukocytosis, both actual and relative, was demonstrated in one protracted case (M. G.) during the first outbreak of dysentery after a repeated therapeutic dose of the dysenteric vaccine. Six hours after a subcutaneous injection of 75,000,000, the total count rose from 6,400 to 19,400 and the polymorphonuclears from 56 to 76 per cent, with a loss of eosinophiles. No constitutional reaction followed successive small doses in this patient, although there was an apparent improvement in symptoms.

A polymorphonuclear leukocytosis was observed in a second case eighteen hours after an initial prophylactic inoculation of 500,000,000, and six hours after the onset of a severe constitutional reaction with fever and vomiting. Total count, 18,800; polymorphonuclears, .92; lymphocytes, .08; large mononuclears, transitionals and eosinophiles, 0. This was the only count made in this case. There is no record eleven months later that this patient has had an attack of the disease.

Because of these isolated observations it seemed worth while to study the leukocytic reaction more carefully, and during the seventeen months following the first outbreak of the disease several series of examinations were made, including one woman and four men who had neither the disease nor prophylactic treatment, and four women who had had the disease from nine to seventeen months previously (Tables II and III). Subcutaneous injections of vaccine were given for two or three successive weeks in doses as in prophylactic treatment, beginning

with 500,000,000. In two cases the counts were taken at two-hour intervals during the first twenty-six hours after the inoculation. In all the other cases counts were taken either during the first twelve or second twelve hours at one-half, one hour, or two-hour intervals.* Differential as well as total counts were made and a control count was made in each case. There was no constitutional reaction observed in any of these cases, and the local reaction was a moderate one.

Table II. — Leukocytic Reaction following Vaccine Inoculations in those who have had the Disease.

Case J. W. — Dysentery 11 months previously.

[Vaccine 500,000,000.]

		,	Гіме				Total.	% Poly.	Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Contr	ol,						6,300	56	36.5	4.5	1.5	1.5
1	Hour	s afte	er Ind	cula	tion.							
12,							9,100	-			-	-
14,							10,000	70	25	5	-	-
15¾,						.1	10,400	70	25	2.5	1	1.5
18,						٠,	7,200	61	35	3.5	.5	-
20,						. 1	6,800	56	43	1	-	-

Case J. W. — Dysentery 11 months previously, seven days after first inoculation.

[Vaccine 1,000,000,000.]

			Т	IME.				Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Cor	atro	ol,						7,300	57.5	31.5	8	2	1
	H	lour	s afte	er Inc	culat	ion.							
12,								11,400	61	30	8	1	-
14,								11,300	75.5	18.5	5	1	-
16,							. 7	10,600	-	-1/	-	- 1	-
18,								10,600	76	18	6	10.0	-
20,								10,200	59.5	40	-	.5] -

^{*} A number of these counts were made by Mr. John C. Rock of the Harvard Medical School.

Table II. — Leukocytic Reaction following Vaccine Inoculations in those who have had the Disease — Continued.

Case J. W. — Dysentery 11 months previously, eighteen days after second inoculation.

[Vaccine 1,000,000.]

		7	TIME.	9			Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Mast.
Contro	ol,						9,100	38.5	56.5	2.5	1.5	1
H	lour	s afte	er Inc	ocula	tion.							
121/4,							4,600	68	27.5	2.5	1	1
131/4,							9,900	64.5	25.5	6	2	-
141/4,							9,400	63	32	3	2	-
151/4,							17,300	68	28	3	1	-
171/4,							10,800	64	32	3.5	.5	-
19¼,							11,500	63	36. 5	.5	-	-
21½,							11,900	69	30	-	1	-
23½,						- 1	9,900	63	33.5	2.5	1	-

Case A. O. — Twelve months after first attack, second day after recovery from second attack.

[Vaccine 500,000,000.]

	7	Гіме.				Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Control,						7,400	-	_	-	-	_
Ноит	s aft	er Inc	cula	tion.							
121/4, .						12,200	_	-	-	-	-
131/4, .						14,500	-	-	-	-	-
141/4, .						15,200	76	19	4	.5	.5
15¼, .						19,500	72	20	2.5	5	.5
17¼, .						22,700	71.5	20.5	1.5	4.5	2
19¼, .						13,600	71	22.5	4	2.5	-
21½, .						17,300	60	35	2.5	2.5	-
23½, .					. 1	10,000	45	47.5	4	3.5	-

Table II. — Leukocytic Reaction following Vaccine Inoculations in those who have had the Disease — Continued.

Case A. O. — Eighth day after first inoculation, tenth day after recovery from second attack.

[Vaccine 1,000,000,000.]

		3	IME.			Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Con	trol,					7,000	42	45	5.5	6	1.5
	Hour	rs aft	er Inc	culat	tion.						
14,						9,100	58	37.5	1	3.5	-
15,						9,600	65	33	2	-	-
16,						7,800	59.5	34	4	2	.5
17,						7,400	62	33	1.5	3.5	
18,						7,300	66.5	29	2.5	1	1
19,						8,500	73	24	2	1	0
20,						8,900	73	24	0	2	1
21,						10,700	78	19	1	2	0
22,						11,300	71	26	1	2	0

Case M. G. — Dysentery nine months previously.

[Vaccine 500,000,000.]

	Tı	ME.				Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.	Temp.
Control,						7,800	60	35	3	2	-	98.6
Hours	after	Ino	cul	ation.								
2,						8,600	72	20.5	5.5	2	-	98
4,					.	8,200	-	. –	-	-	-	98
6,						6,800	56.5	34.5	7	2	-	98.4
8,						9,800	69. 5	2 5	4	1.5	-	98.2
10,			•			13,300	66	28.5	4	1,5	-	98.8
12,						15,500	54.5	36.5	8	1	-	98.8
14,						13,900	64	30	6	0	. 5	98
16,						11,700	64	35.5	.5	0	-	98
18,						9,300	71	25	3	1	-	98
20,						10,600	73.5	20	5	1.5	-	97
22,						10,600	76	22	2	0	-	98.2
24,					.)	9,000	63	31	6	0	- ,	98.4
26,						9,000	78	22	0	0	-	99.4

Table II. — Leukocytic Reaction following Vaccine Inoculations in those who have had the Disease — Continued.

Case M. G. — Third day recurrent attack, 17 months after first attack.

[Vaccine 500,000,000.]

		7.	Гіме.				Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Con	trol,						9,900	60	34.5	5	.5	_
	Hor	ırs aft	er Ind	cula	tion.							
1/2							13,200	59.5	37.5	2	1	-
1,							10,700	61	34.5	2.5	2	-
1½,							9,800	67.25	28.5	4.25	-	-
2,							7,600	44	54	2	-	-
3,							7,800	66	32	-	2	-
$19\frac{1}{2}$, .						7,100	80	20	0	0	0
201/2	, .						10,400	70	26	2	1	1
211/4	, .						11,000	71	26	2	1	0
221/4	, .						10,700	81	19	_	0	0
231/4	, .						9,600	73	26	1	0	0
241/4	, .				•	٠	13,700	71	29	0	0	0

Case M. C. — Sixteen months after first attack.
[Vaccine 500,000,000.]

		Т	Гіме.			Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Cont	trol,					12,700	57	40	0	3	0
	Hour	rs afte	er Ind	culat	ion.						
2½,						8,400	68	26	0	5	1
3,						10,400	67	29	0	3	1
6,						10,100	52	44	0	4	0
8,						10,700	50	48	1	1	-
10,						11,600	62	37	0	1	0
11,						11,400	65	47	0	1	0
12,						10,500	60	34	3.5	2.5	-

Table II. — Leukocytic Reaction following Vaccine Inoculations in those who have had the Disease — Continued.

Case M. C. — Seven days after first inoculation.

[Vaccine 1,000,000,000.]

		7	Гіме.				Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Con	ntrol,	rs aft	er Inc	oculai	:	•	12,400	-	-	-	-	-
2,							9,600	56	3 9	1	4	-
4,							14,200	58	33	3	5	1
6,						•	9,200	58	31	4	6	1
9,						-3	12,000	54	41	3	2	-
11,		••				. }	14,000	40	55	4	1	-

Case M. C. — Nine days after second inoculation.

[Vaccine 1,000,000,000.]

		7	Cime.			Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Cont	rol,					9,100	49	50	.5	.5	_
	Hour	s aft	er Inc	cula	tion.						
2,						12,500	68	28	1	3	-
3,						 11,500	56	42	1	1	-
5,						15,100	75	25	0	0	-
6,						14,600	60	40	0	0	_
7¼,						14,300	70	30	0	0	-
81/4,						13,700	60	40	0	0	_
10,						11,900	74	25	0	1	-

Table II. — Leukocytic Reaction following Vaccine Inoculations in those who have had the Disease — Concluded.

Case M. C. — One month after vaccination, second day after recovery from recurrent attack.

[Vaccine 500,000,000.]

		Γ	IME.			Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas
Contr	rol,					13,900	50	39	10	1	-
1	Hour	s afte	r Inc	culat	ion.						
½,						12,200	49	45	4	2	-
1,						7,400	56	40	2	2	-
1½,						6,200	49	44.5	2.5	4	-
2,						9,600	79	21	0	9	-
3,						9,700	51	41.5	5	2.5	-
19,						8,200	64	27.5	8	.5	-
20,						9,000	76	19.5	.5	4	-
203/4,					. •	8,300	63	34	2	1	-
21,						11,200	66	31.5	1	.5	-
22,						9,900	-	-	-	-	-
23,						12,500	77	18.5	3.	1.25	. 25

Table III. — The Leukocytic Reaction in Prophylactic Treatment.

Case W. F. — Prophylactic treatment.

[Vaccine 500,000,000.]

		r	IME.			Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Mast.
Contr	rol,					11,600	64	29	1	6	_
i	Hour	s afte	er Ind	cula	tion.						
2,						9,400	67.5	28	0	4.5	0
4,						10,300	59	35.5	1	4	.5
6,						9,300	59	33	1	6	1
81/4,						9,500	67	29	0	4	0
101/4,						10,800	70.5	25	1	3	.5
22½,						12,700	64	30	2	3	1
24½,						12,000	69	29	1	1	-

Table III. — The Leukocytic Reaction in Prophylactic Treatment — Continued.

Case W. F. — Second inoculation.

[Vaccine 1,000,000,000.]

		7	Гіме.				Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Conti	ol,		•				9,200	67	21	8	4	-
4	Hour	rs afte	er Inc	culat	ion.					-		
2,							11,000	69.5	24.5	3.5	2.5	-
4,							14,400	73.5	20.5	5.5	.5	-
61/4,							13,300	74	17.5	2.5	5.5	.5
9½,						.	15,400	73.5	21.5	2.5	2.5	-
11½,						. }	16,500	78	14	4	4	-

Case W. F. — Third inoculation.

[Vaccine 1,000,000,000.]

		7	CIME.			Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Cor	trol,					10,000	69	28.5	1	1.5	_
	Hour	rs aft	er Ind	oculai	tion.						
2,		•				11,500	74	20	2.5	3.5	-
3,		•				7,800	60.5	33	2	4.5	-
5,		•				12,900	78	18	1	3	-
6,	٠.					13,000	69	21.5	4	5	.5
7,						12,600	69	27	-	4	-
8,						13,000	75	21	-	4	-
10,		•				13,300	64	32	1	3	-

Table III. — The Leukocytic Reaction in Prophylactic Treatment — Continued.

Case C. H. — Prophylactic treatment.

[Vaccine 500,000,000.]

		Т	IME	e.		Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.	Temp.
Cont	rol,			i		5,100	42	47.5	7.5	3	-	98
H	ours	afte	r Iı	rocul	ation							
2, .						6,800	51	37.5	8	.5	3	98.6
4, .						7,200	45	47	5	-	3	98.8
6, .						9,400	70.5	25	4	.5	-	99
8, .						9,400	66	25	6	2.5	.5	98.8
10, .						10,800	62	29.5	6	2	.5	99
12, .						12,900	59	29.5	6.5	3	2	99
14, .						10,400	57	32	8	1	2	98
16, .						7,800	56	36	5	2	1	98
18, .						6,800	53	41	5	1	-	97.6
20, .						7,200	48	43	7	1	1	97.2
22, .						6,400	49	40	9	1	1	99
24, .						7,500	58	29	12	1	-	99
26, .						6,800	50	44	5	-	- 3	99

Case S. S. — Prophylactic treatment.

[Vaccine 500,000,000.]

		7	Гіме.				Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Cont	trol,						5,400	63	26	6	5	-
	Hou	rs aft	er Ind	oculat	ion.							
12,							8,400	62	29	7	2	~
14,							11,400	63.5	30	-	5	1.5
16,						•1	10,900	56	36	3	4	1
18,							12,400	51	40	5	3	1

Table III. — The Leukocytic Reaction in Prophylactic Treatment — Continued.

Case S. S. — Second inoculation.

[Vaccine 1,000,000,000.]

		7	Сіме.			Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Cont	rol,					9,400	53	42	3	1.5	.5
	Hour	rs afte	er Ind	ocula	tion.						
12,				•		19,500	62.5	35.5	1	1	-
14.						14,800	50	42.5	3	4	. 5
16,						13,200	72	24	2	2	-
18,						20,200	73	22	2	3	
20,						16,000	64.5	31	3	1.5	-

Case F. N. — Prophylactic treatment. First inoculation.

[Vaccine 500,000,000.]

		J	IME.				Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Mast.
Con	trol,						12,400	69	27	1	3	
	Hour	rs afte	er Inc	oculai	ion.							
2,							14,000	73	23	3	1	_
4,							11,300	67	29	_	4	_
6,							10,200	74	19	2	5	_
8,							10,200	78	14	2.5	5	. 5
10,							12,000	60.5	32	2	5	. 5
22,							14,600	-	-	_	-	-
24,						·	13,000	-	-	-	- 1	-

Case F. N. — Prophylactic treatment. Second inoculation.

[Vaccine 1,000,000,000.]

		7	IME.			Total.	% Poly.	Lymph.	% Trans. L. M.	% Eosin.	% Mast.
Contr	ol,					12,200	_	_	-	-	_
j	Hour	s afte	er Inc	cula	tion.						
2,						14,500	80	15.5	3	1.5	-
41/4,						23,000	72	21.5	1	4.5	1
61/4,						 24,000	69	27	1	2	1
83/4,						19,400	79	17	1	3	-
10¾,						16,000	63	30	2	5	-

Table III. — The Leukocytic Reaction in Prophylactic Treatment — Concluded.

Case H. D. — Prophylactic treatment.

[Vaccine 500,000,000.]

		7.	Гіме.				Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Cor	ntrol,					•	6,600	49	46	1	4	_
	Hou	rs afte	er Ino	culat	ion.							
12,							10,400	61	29	5	5	-
14,							10,800	69	22	2	7	_
16,						• ()	11,500	77	19	1	3	-
18,							13,000	60	34	3	3	-
20,							9,900	58	36	1	5	-

Case H. D. — Second inoculation.

[Vaccine 1,000,000,000.]

		7	Гіме.				Total.	% Poly.	% Lymph.	% Trans. L. M.	% Eosin.	% Bas.
Cont	rol,						8,000	-	-	-	-	_
	Hour	s aft	er Ind	ocula	ion.							
12,							13,200	66	28	5	1	-
14,							13,500	75	20	2	3	-
16,						•0	14,300	77	20	2	1	-
18,							11,500	62	36	2	-	-
20,							14,200	59	38	1	2	-

The leukocytic reaction consisted of a hyperleukocytosis, with the highest count rising but little above twice that of the normal count for the individual, and a relative increase in polynuclears at one or more periods during the following twenty-four hours, this relative increase not always being synchronous with the highest total count.

The reaction was somewhat more marked after the second or third inoculation than after the first, except in one case (A. O.), in which the vaccine was injected shortly after a recurrent attack. In this case the reaction was greater after the first injection of 500,000,000 two days after the attack than after the second inoculation of 1,000,000,000, seven days later. One case (M. G.), referred to above as showing marked reaction to vaccine therapy in the first attack, showed a moderate reaction both in total and differential counts following an inoculation of 500,000,000 nine

months later; and on the third day of a recurrent attack seventeen months later gave evidence of a reaction only in a relative increase in polymorphonuclears following an injection of 500,000,000. The diarrhea in this last instance ceased a few hours after the inoculation, and there was no evident constitutional disturbance. The recurrent attacks were milder than the first one, and appeared usually in the form of a diarrhea.

There is no record that the individuals chosen as normal cases in this series of examinations have had an attack of dysentery or diarrhea.

In comparing the leukocytic reaction with the clinical history in these cases the following conclusions have been made:—

- 1. The stronger normal individuals show more reaction to subcutaneous injections of vaccine than the weaker ones who have had the disease and recurrent attacks.
- 2. The leukocytic reaction for the individual is more marked during or immediately after an attack of the disease and diminishes with recurrent attacks. This corresponds to the clinical observation that the resistance of the individual to the disease is lessened by a previous attack.
- 3. The fact that there may be a polymorphonuclear reaction to a subcutaneous injection of vaccine, coincident with the cessation of a diarrhea, would indicate the use of a vaccine therapy. In the few cases in which this treatment has been given the results have been favorable for a recovery from an attack.

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NEWER CONCEPTIONS OF DEMENTIA PRÆCOX BASED ON UNRECOGNIZED WORK.*

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Just as our knowledge of any given subject comes to being out of many little nebulous masses, so we have gained a certain amount of insight into the nature of dementia præcox. the science of any subject owes its accurate development to the work of the laboratory, so our present knowledge of dementia præcox has been built up from the many little nebulous masses which have developed in the laboratory, but which have developed into a concrete whole — paradoxical as the idea may seem. And yet, this disease form which makes up nearly a quarter of all the cases admitted to hospitals for the insane, and which accounts, more than any other single factor, for the necessity of building more of such institutions, has been neglected from the only side which can possibly give us hope of combating its spread, — the laboratory side. Its treatment has been largely custodial, symptomatic, not to forget recent developments in industrial teaching and in social service work.

Laboratories deal with technical methods, and for this reason a discussion of our present knowledge of dementia præcox, or a presentation of newer conceptions of dementia præcox from the laboratory point of view, must be more or less intimately linked with a discussion of the methods used in obtaining the knowledge.

The institution of exact methods begins with the investigation of the cause of death by means of the post-mortem examination. The earliest investigation of a case of dementia præcox that I have been able to find, where the brain and organs were examined and the examination published, was in 1844, by Alquié (quoted by Cramer 1 in 1896). The chief finding of interest to us is that the gray matter of the brain was injected. This observation I take to be of the utmost importance, not only because it was a true observation, doubtless, but because it is a frequent finding even to-day, though not confined to dementia præcox, of course. The method of observation is also important and the one most generally used in medicine. It is called the gross method or the macroscopic examination. Using this

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method, much valuable information has been obtained concerning the nature of dementia præcox.

Jehn,² in 1877, speaking of acute delirium, and some of these cases certainly look like dementia præcox mentally, remarks on a high grade of vascularity found, as did Alquié. There is hyperemia, clouding of the pia, reddening of the cortex, increased cerebrospinal fluid, and edema of the brain. There are changes in the other organs, and the hemoglobin comes out of the blood. L. Meyer (1857), speaking of "acute fatal hysteria", mentions extensive venous hyperemia (Cramer 1). Pauly 3 (1869), in a dissertation at Bonn, mentions edema resulting from hyperemia. Schüle 4 (1879) separates two types of acute delirium, — one showing hyperemia of the pia, a few with serous edema, especially of the frontal lobes, some with milky, diffuse or punctiform clouding and reddening of the cortical surface of the meninges; the other group showing nothing in the meninges but a venous hyperemia in the brain and an increase in the cerebrospinal and ventricular fluid. Rezzonico 5 (1884) gives the history of a male of forty-seven years of age who died after eleven days of excitement. There were no external signs of disease or injury, but the cortex and white matter were remarkably hyperemic. Similar observations were made by Ball 6 (1885) and Holsti 7 (1884). Thickening of the meninges without exudate is frequently seen, as noted by Klippel and Lhermitte (quoted by Zingerle 8), Obregia, Schütz 10 (1909), Lukacs 11 (1908), Marchand, 12 Goldstein 13 and Weber 14 (1899). So hyperemia of the brain, thickening and adhesions of the meninges were the observations of the day in cases which we can recognize to-day as being those of dementia præcox and of the infections or intoxications, and these findings were linked with the interests of the day such as intracranial circulation, pressure and stasis. Such were also the findings of Kahlbaum 15 in his monumental work differentiating katatonia, or tension insanity, as he called it.

The gross method was not exhausted with these observations, but turned in new directions after many years. Examination of the convolutions came next, with the claim that there was atrophy (Klippel and Lhermitte, ¹⁶ 1907), that there was decrease in size of the white matter and of the cortex (Obregia, 1906, and Zimmermann, ¹⁷ 1907), that there was hemiatrophy and lobar atrophy of the cerebellum (French writers and later Morse and Taft ¹⁸), and that there was convolutional asymmetry (Mondio, quoted by Omorokow ¹⁹).

Another form which the gross method took was the investigation of the relation existing between brain weight and cranial capacity. This was first made practicable by Reichardt 20 (1907-11), who showed that there was little difference between the weight of the brain and the capacity of the cranium in certain cases of katatonia, dving suddenly, with or without convulsions. The same was true in some cases of epilepsy, the difference being 0 per cent. Cases described by Nonne 21 as "pseudotumor cerebri" (1904) are of the same sort, and their histology has been described in detail by Rosental 22 (1911). These are cases which give evidence of tumor clinically, but prove the diagnosis to be wrong by cure or autopsy. Such a case was published by Dreyfus 23 (1907) from the Basle Psychiatric Clinic. The patient was a male dementia præcox of twenty-nine at onset, who died suddenly at thirty-two years of age. The brain was stained with several stains, in sections taken from eight different areas, and no changes were found, but the cord was large for the spinal canal, and the brain was 140 grams too heavy for the cranial capacity. Death was due to acute brain swelling.

The interval between these two great periods of research with the gross methods was taken up with the study of the minute details of brain pathology by means of the microscope and the newly discovered color chemistry. Most of the work on dementia præcox, as in other branches of pathology, has been done with the methods of finer histology, neglecting the more logical ones of photographing the gross changes observed so that they might be preserved for comparison in large numbers of cases from all parts of the world; neglecting the fact that study of the frontal section in series might yield something, and this to be photographed; neglecting the fact that the whole brain microtome can give valuable information in the psychoses, and going directly to the finer histology with the attempt to get the section ever thinner.

The results obtained over the years have been very much at variance, and often appeared to be extremely contradictory, but the time has come when a certain uniformity can be put upon them and they can be understood.

To unify the large amount of material which has accumulated, and at the same time to show that the changes found are very much alike, I have selected cases from the following groups, and have arranged the results under the dementia præcox group, the confusional and delirious group, a single case of "pseudotumor," and the general work on the nervous elements in the psychoses.

In 1896 the findings in the acute case of the paranoia group were given by Cramer. A male of twenty-four, duration seven days, had shown albumin and fatty casts. Temperature was 40.5° C., pulse 132, respiration 48. Autopsy was performed ten hours post mortem. No leucocytes were found in the tissues. There was hemorrhage about the small vessels of the brain and thinning of the interradiary and tangential fibers in places. writer concludes that a case not manic or melancholic, but paranoiac or possibly confusional, can show severe changes of a noninfectious character. This is the type of case we meet repeatedly in the literature, until we come to agree with Goldstein ²⁴ (1910), that there are few uncomplicated cases in the literature: and we must finally agree that there can be no uncomplicated cases, if our methods of diagnosis and of pathological examination are adequate. Certain it is that the number of supposed uncomplicated cases has become remarkably few with rapid advances in accurate diagnosis and accurate protocol taking.

In 1906 Klippel and Lhermitte 25 described changes in the spinal cord of cases of dementia præcox. One case was that of a male of twenty-nine in which the cord showed changes in the posterior columns exactly like those seen in tabes. Another case, age thirty-five, gave changes in the lateral columns, without meningitis and without cord symptoms clinically. One of these writers 26 had previously (1904) described cases of dementia præcox in which there were no changes in the vascular connective tissue elements of the brain, but only in the neuroepithelial elements. There were no leucocytes, no diapedesis, no hyperemia, no proliferation or degeneration of the walls of the vessels. He concluded from his studies that dementia præcox was a degenerative disease of the neuroepithelial elements of the brain and cord without involvement of the vascular connective tissue elements, and that where the latter appeared to be involved the involvement was due to intercurrent disease. 1909 Moriyasu ²⁶ presented nine cases, studied in extenso, in which he showed that the fibrils were fragmented and distinctly decreased in number. Changes in the ganglion cells were definite and distinct, but, in accord with all workers, the changes in the ganglion cells were not characteristic of dementia præcox. cular changes were not significant. The glia nuclei were increased about the blood vessels, especially in the white matter, and there was satellitosis about the pyramidal cells. He also says that changes in Clarke's column of cells in the spinal cord

are constant. No plasma cells were found in any of his cases. He studied seven females and two males, ranging in age from twenty-five to fifty-three. The duration of the disease was from a few days in one case to two years in one case. One died of erysipelas, two died suddenly, cause not given, and the cause of death was not given in the other six cases. To have quoted one thorough worker is to have quoted the rest most completely. Klippel and Lhermitte mention a pigment increase in the neuroglia (quoted by Moriyasu ²⁷). Mondio ²⁸ (1905) says that the changes in the ganglion cells are those seen by others in idiocy and in the intoxications. Obregia ²⁹ mentions chromatolysis and meningeal thickening, with proliferation of the cells of the meninges and of the vascular adventitia.

Glia increase, both cellular and fibrillar, with changes in the cells and fibrils; pigmentation of the nerve cells and of the glia and pigment lying free in the tissues or about the vessels or in the vessel walls or lumen; the presence of small lymphocytes or of leucocytes; loss of myelinated fibers; degeneration products such as fatty and protogonoid granules; satellitosis and neuronophagia have all been observed and recorded.

What are the microscopic findings in the frankly delirious cases? The confusional cases? The toxic cases? Perhaps the first good description of that picture is the one given by Jehn 2 in 1877. The vessels showed fatty degeneration and nuclear heaps and pigmentation. There was extravasation of blood and overgrowth of glia. The lymph spaces contained fat, and the cell protoplasm showed it also. Next, Rezzonico,5 in 1884, showed dilatation of the finest vessels, with fatty degeneration of their walls and emboli made up of groups of micrococci. He noted in his writings that Briand had already, in 1882, found bacilli in the blood in 3 out of 7 cases of acute delirium. What threw many cases out of the delirious group and into the dementia præcox group, or what corresponded to it then as to-day, was the absence of any notable fever; and albuminuria was only slight. How many times have we seen that ourselves in cases that went rapidly to a fatal termination?

Next, as might be expected, a specific bacillus was described for acute delirium (Bianchi and Piccinio, 30 1895). But the histological changes found were the same as those found in dementia præcox, — clouding of the pia, edema of the brain, adhesions of the meninges, capillary hemorrhages, extravasation of blood pigment, emigration of leukocytes, acute cellular degeneration

(Cramer, quoted by Binswanger and Berger,³¹ 1901), increase of glia and vascular nuclei (Popoff, quoted ³¹), swelling and degeneration of the myelin sheath (Schukowsky, quoted ³¹), satellitosis, chromatolysis (Weber,³² 1904).

What were the general findings in the psychoses by Nissl and Alzheimer, and those working at about their time, in and out of their laboratories? Alzheimer,33 in 1906, remarks that with the same tinctorial methods which enabled us to differentiate general paralysis from senile dementia, etc., we are unable to show differences in the simple psychoses. Pathological changes are not lacking, he states, but who will number the cells or fibers lost? This seems to be his idea of the proper direction for future research in the psychoses. Fat occurs in epilepsy and in many other conditions besides the infections and dementia præcox. Protogonoid substances occur also in amaurotic idiocy (Alzheimer 33). The neurofibrils, as studied by the Bielschowsky method (Schütz,34 Jena, 1908), have lost their network arrangement in the cell bodies in dementia præcox, general paralysis and secondary dementia. Glia proliferation has been observed in general paralysis, senile dementia, alcoholics, uremic psychosis and typhus delirium (Nissl, quoted by Alzheimer 35). Yellow pigment in the cell bodies, first claimed by Campbell 36 to be pathognomonic of senile dementia, was found by Alzheimer 35 to exist also in epilepsy, arteriosclerotic degenerations and in general paralysis. Then Rosental 37 (1913) demonstrated that changes in the glia resembling the ameboid glia could be produced experimentally by the injection into rabbits of guanidin, sodium oxalate or of foreign serum into a sensitized animal. Granular degeneration and neuronophagia were also produced. This writer demonstrated, also, that the ameboid glia were certainly not post-mortem appearances. A series of non-insane cases studied by Vogt 38 (1901) showed degeneration of cells, increase in neuroglia, and exudate in non-insane cases. Tuberculosis, according to him, shows chronic changes in the nerve cells generally, and may show increase in the glia.

With the case of pseudotumor cerebri (Rosental,²² 1911) there appeared the acute Nissl reaction so often seen in the infectious processes, and also ameboid glia, satellitosis, protogonoid granules, and lipoid inclusions in the cells, just as we have seen in all the conditions presented in this paper.

The earliest and, perhaps, the best statement of the meaning of all this is one written in 1898 by Juliusberger and Meyer.³⁹

They were of the opinion that the changes found were "evidence of abnormal life processes in the cell", and this simple statement can scarcely be excelled to-day. We can add just one thing to it, perhaps, and that is to state a little more clearly just what those abnormal life processes are, and just a little as to how they may be effected. We have done this when we consider the reactions of the human organism, with its fats, carbohydrates and proteins, to the foreign substances which invade it, whether or not as bacterial protein or fat, and when we add to our considerations the susceptibility of the individual, especially whether or not he is hypersusceptible. We were all interested, I am sure, when we read in the Journal 40 that the typical histological picture found in the organs in tuberculosis had been produced experimentally by the injection of the waxes from the bodies of tubercle bacilli into several different laboratory animals. The whole of pathology itself seems rapidly to be resolving into just such considerations and possibilities.

The conclusion from the above work, that certain cases of dementia præcox may be of toxic or infectious origin, is almost foregone. With this introduction I wish to present four cases from the records of the Worcester State Hospital, in which the toxic factor was a large one, but was not recognized until autopsy or until certain special tests were applied, namely, the spinal fluid and blood examination by microscopical, chemical and serological analysis.

The first case was that of a female, W. S. H. No. 23119, age fifty-seven, diagnosis dementia præcox. Onset was at forty-four to forty-nine, variously estimated. She was first admitted to the McLean Hospital in 1903. She had been an efficient worker, but gradually came to think that people were talking about her, later expressing the idea that she was boycotted and that people pointed her out on the street. Then she heard the telephone buzzing all night and said that some one kept a lawnmower going another night. She was finally found on the roof, where she went to get rid of the voices. At the hospital her conduct was quiet and natural, but she seemed a little depressed and preferred not to talk about her troubles. She was discharged, but had to return because the scrubgirl made faces at her, as did the priest in church, and voices dictated to her what she should do, and derided her over the telephone. She became exalted and incoherent. She had some insight at first, saying that she could not understand how the voices could be heard, but insisting that

she heard them. Physically her condition was good, and she gained in weight about six pounds. She left the hospital again in 1904 and returned in 1908. She was rather more demented than when she left, but physically she complained only of feeling tired all the time. Her weight dropped steadily from about 160 at last admission to about 90 pounds at death in 1915, a period of seven years. The post-mortem examination showed adhesions in both pleural cavities, with fluid in the left cavity. Both lungs showed masses of tubercles, many of them coalescing and breaking down to form cavities. There were also irregular, circular ulcers in the ileum near the cecum. No discovery was made of the patient's condition clinically, when an X-ray examination of her chest at the outset would doubtless have revealed it.

The second case was that of a male, W. S. H. No. 26963, of unknown age, but thought to be about fifty-two. He was admitted to the hospital in 1910, and died suddenly in 1915 of coronary sclerosis with occlusion and acute hemorrhagic pancreatitis. He had led rather an irregular life, admitted having had private disease twice and having been treated for gonorrhea at Tewksbury. Was told, a long time ago, that he had a chancre. He says he caught the fever at eighteen and his hair came out. He married twice: his second wife was a dissolute woman and was drunk most of the time. She left him about fourteen years ago. Patient admitted arrests and serving sentences and that he drank too much. The onset of his trouble was in 1909, coming gradually and finally terminating in his refusing to pay for a meal at a restaurant one day, on the ground that he owned the place. He was confused and rambling on admission. Said he could hear the voices of his parents and the voice of Jesus. Stated that "when he had his beard on" he could climb a telegraph pole and telephone to any one. He became irritable, silly, demented. After three years he said he could still see God, and later that his father and mother still talked to him, but that he was not bothered any more by it. His physical condition was always good. He took up the work assigned to him and had parole, sweeping up the yards, and so on. He had a scar on the prepuce, a palpable liver and a negative blood Wassermann. The spinal fluid examination was not made. The practice of not taking a Wassermann on the spinal fluid because the blood Wassermann, is negative cannot be too strongly deprecated, as this case with the scar on the prepuce and the abundant history and the next case show.

The third case was that of a male, W. S. H. No. 28853, age twenty-nine on admission, age thirty at death; total duration about two years. The patient was one of 26 pregnancies; 2 miscarried, 18 died in infancy, 1 died of convulsions, 2 boys and 4 girls still living, and one of these has "fits." I cite these facts because there is some question in my mind as to whether the patient was not one of those congenital syphilitics whose disease becomes manifest at a later time than we are in the habit of thinking (Dr. Abner Post, Neurosyphilis Conference, Grafton State Hospital, 1916).

About nine months before admission to the Psychopathic Hospital (No. 2632) the patient had become excessively alcoholic and oversexual. Two months before admission he had auditory hallucinations and thought he was about to be killed. became maniacal, destructive to furniture and went out at night only partially clothed. He would remain from home a week at a time, contrary to his usual habits. On admission, he said he was "confused in his head." He was inaccurate about his recent movements and about the ordinary facts of his life and of his family. He was easily distracted, and had exalted ideas about his talents as a singer, demonstrating until he was hoarse. Knee jerks were unequal and absent on the left. Admitted to the Worcester State Hospital, he was at first loquacious, showy, euphoric, but became irritable, sullen, resistive, mute and had to be tube-fed. Later he had a convulsion, became wildly excited, then mute, untidy and stuporous. At the last he showed typical katatonic rigidity, with legs drawn up and massive, multiple decubitus developing. At the Psychopathic Hospital the provisional diagnosis had been manic-depressive insanity, manic phase, then dementia præcox, and finally, with the appearance of the Wassermann, general paralysis. The blood was positive. spinal fluid showed 732 cells, and the globulin and albumin were each 3 plus.

Autopsy showed a scar on the corona, there were dense adhesions in the pleural cavities, and fresh tubercles or gummata were present in the lungs. The pia was thickened and showed whitish plaques. The brain weighed only 935 grams. The frontal poles were pointed, the right being much smaller than the left. The parietal regions were especially soft. The left cerebellar hemisphere was smaller than the right. The posterior columns of the spinal cord were almost confluent.

The fourth case is that of a negress, W. S. H. No. 30094, age nineteen, who was admitted to the Psychopathic Hospital (No.

5918, No. 6412) on March 20, 1916, transferred to the Worcester State Hospital March 29, and died April 2. On March 15 she began to fail, and since she had failed to receive a certain letter from a certain young man, and since she was a mental case, the two facts seemed connected in some hidden manner. But on March 19 she had complained of malaise, anorexia, pain in the epigastrium, and later of a "bursting headache." Her temples beat and her neck felt stiff. That evening, while setting the table, she disappeared, and was not found until the next morning, in an empty room next to her own, where she lay with her throat cut. She slowly recovered from the stupor in which she was found, when she explained that she had been drawing water when her head began to swim and she did not know anything more but that she had felt crazy. Her replies at the hospital were inaudible, given only on close questioning, and she was stupid, apathetic and indifferent. March 26 she developed cerea flexibilitas, muttered through her teeth, and retained her saliva. The breath had a foul odor. She said the doctor told her she was going to have a baby, but admits that she had a menstrual period only the week previously. Pulse was 132, temperature 100-101° F. constantly, respiration 20. She became restless, mute, untidy, resistive, at times shouting and at the end picking at the bedclothes. On March 30 there was a trace of albumin, numerous red blood cells, and numerous hyaline and granular casts in the urine. The sputum was thin, green and purulent, and showed leucocytes and a bacillus morphologically like the influenza bacillus. The post-mortem examination was practically negative, and the case was reported as one of katatonic exhaustion or "Hirntod." But cultures taken from the heart's blood at autopsy showed a bacillus which, in its morphology and cultural characteristics, was the influenza bacillus.

Summarizing, we have two cases of the paranoid form of dementia præcox, both of rather long duration, one male and one female. One died of tuberculosis, the other of hemorrhagic pancreatitis and coronary sclerosis. And we have two cases of the katatonic form, both of comparatively short duration. One died of paresis, the other died of influenza. In one case of the four, only, could the mental diagnosis be questioned. The paretic case could be settled only with the Wassermann technic. The paranoid case with the alcoholic history and the history of chancre might be questioned. All but this one died of an infection. In two of these the infection undoubtedly ran parallel to

the mental symptoms. In the third, which died of tuberculosis, is it too much to imagine that the mental symptoms also paralleled the physical disease?

The microscopic findings were studied by the photographic method on twenty-four sections from each side of the brain in each case. These were arranged according to what we know of the great functional subdivisions of the brain, — the pre-Rolandic and the post-Rolandic, — the latter being divided into parietal, temporal and occipital to correspond to general sensibility, hearing and sight.

The stain used was the Scharlach-R for fat, because it is the most general stain we have for degeneration products of the nervous system, and because it photographs so well.

The sections were cut at 50 micra, with the idea that, if fat were found, it might present itself in some sort of radial or stratified way which would fail to show in thinner sections. This did not prove, in general, to be the case in this series, but the method was carried out, as it appeared logical and gave fair photographs.

In general, the fat was found to be fairly evenly distributed over the cortex, with the exception of that in the alcoholic case. Here it was more marked in the general region of the second to fourth layers, or at least to the layers lying more externally. In the tuberculous case there was a distinct massive process in several regions. In the paretic case the fat was more abundant in the white matter, and this more in the post-Rolandic regions, corresponding to the areas that were noted at autopsy to be the softest. The paretic case was the only one showing any considerable fat in the white matter.

A hint has been given in the above at the topographic idea and at the stratigraphic idea. So far as I have been able to determine, only two writers have attempted any definite correlations between disease of cell layers and dementia præcox, or disease of brain areas and dementia præcox. Cotton,⁴¹ as admitted by Alzheimer,⁴² was the first to correlate disease of the second and third cortical layers with dementia præcox, mentioning at the same time that the fat occurs over the entire cortex. Southard ⁴³ was the first to claim a relation between disease of the post-Rolandic areas and dementia præcox of the katatonic form, and between disease of the frontal areas and the paranoid form. Later, Southard and his coworkers have shown some connection between lesions of the angular gyrus and katatonia,⁴⁴ gliosis of

the thalamus and dementia præcox,⁴⁵ and cerebellar hemiatrophy and katatonia.¹⁸

Other writers have laid emphasis in their cases on a predominance of the pathological findings in one layer or another, or in one brain area as against another; but no one has made any special claims for these observations before the writers mentioned above. Alzheimer 42 mentioned changes in the deeper layers at first, later pointing out that they occurred in the more superficial layers to a greater extent. Klippel and Lhermitte 46 found the changes more in the zones of association, in the large pyramids of the third layer of cells and in the fusiform cells of the sixth layer of Hammarberg. Dunton, 46 in a case of katatonic dementia præcox dying of pneumonia, found chromatolysis most marked in the fifth layer of Hammarberg. Lubouchine 47 mentions the molecular layer and the layer of the small pyramids; Lannois and Paviot 48 mention the Purkinje cells of the cerebellum; Koller 49 mentions increase of glia in the superficial layers and in the white matter; Elmiger 50 mentions the free edge as being most affected; Orton 51 finds the ameboid changes more in the deeper layers and in the white matter; Sioli 52 finds more change in the upper layers; Mott 53 in the infragranule layers. As for the fibers, Cramer 1 mentions thinning of the interradiary and tangential systems; Weber, 32 the supraradiary network; Eisath-Hall,⁵⁴ Meynert's layers. All have support in the shape of corroborative work by other investigators.

Dunton ⁴⁶ and Maschtschenko ⁵⁵ claim that the frontal lobes are more affected; Zalplachita, ⁵⁶ the frontal and central; Orton, ⁵¹ that the temporal and occipital are less affected than other parts; but no one has, so far as I can learn, investigated the question of topographical distribution in and for itself, except the writer mentioned above.

The four cases here presented can add little of a decisive nature to these great questions. Only one case presents anything of interest to the stratigraphic question. That is the case of the paranoid with the alcoholic history, who died of hemorrhagic pancreatitis, and his history and physical examination make the diagnosis of dementia præcox somewhat doubtful. However, in his case we do not have to consider the effects of an intercurrent or of a causative infection upon the cell picture, as we do in the three other cases. In his case the fatty changes were more in the outer layers. Topographically, his case was rather indefinite, the fat occurring mostly in the areas of audition

and of general sensibility. The fact that the fatty degeneration is rather marked in the temporal regions in this case is especially interesting in view of the continued auditory hallucinations which the patient experienced, but the fact of its absence in other areas may mean either that the cells in those areas are exhausted, or that they were not affected, at least at the time of the patient's death. To determine whether they were really exhausted would be an especially interesting research in view of ideas entertained that there is a relation between frontal lobe lesions and paranoid dementia præcox.

The idea that the power of the nerve cells to produce fat has been exhausted in those areas where the fat is not found is given support by the findings in the second case of paranoid form, dying of tuberculosis. This case was especially chronic, lasted longer than the first case, and clinically showed much more profound deterioration. From our knowledge of the occurrence of fat in the various pathological processes, we should expect to find an abundance of it here, and yet we find much less than in the first case. The idea gains credence that the fat-producing power is exhausted. In this case there were large masses of fat present, reaching macroscopic size in places, and doubtless connected with the tuberculous processes in the lungs and the intestines, but in general the whole cortex appeared exhausted.

The case of the young katatonic who died of influenza has a most interesting distribution of the fat in the small elements of the cortex, especially in the glia cells and the blood vessel walls. The blood vessels are especially prominent, also, even the finest capillaries standing wide. The fat is distributed here in all layers and in all areas. It is in the most labile elements, the elements which are the most easily affected according to all writers, and the disease process was so fulminating that the nerve cells themselves have scarcely had time to react. Perhaps this case, together with the two previous ones, may give us some idea as to the fat-producing period of the nerve cell. It is evident that no topographic or stratigraphic ideas could be drawn from this case.

The last case, that of the paretic with katatonic mental picture, is striking by reason of the enormous amount of fat to be seen, and because the fat is confined for the most part to the white matter. The question arises here, as in the cases above, whether the cortex is involved at all, or whether it is exhausted. Perhaps we have a type of paresis involving the fibers more

especially and the gray matter rather less, just as it has been suggested (Southard ⁵⁷) that there are two types of feeble-mindedness,—the type with plenty of pathways, but little to go over them, and the type with plenty of receivers and senders, but few wires. The topographical significance in this case is great because the chief degeneration was found in the post-Rolandic regions, corresponding to the katatonic picture presented by the patient; and at autopsy, the especial softness of the parietal areas was noted.

With such an array of pathology as presented in the literature and in the histories and examinations of these patients, one should hesitate to make an unqualified diagnosis of dementia præcox, in the manner in which such diagnoses are made in many hospitals. There are few uncomplicated cases of dementia præcox. The question of a faulty diagnosis, the placing of a patient in the class of dementing psychoses of unknown cause, is often a difficult one to settle, but the attempt should always be made, and methods should be added to the diagnostic facilities of most of our hospitals for the insane. Even in this small number of cases the paretic one would most certainly have been missed had the patient's blood proved negative to the Wassermann examination, and if it had been examined from certain of our hospitals. I have repeatedly taken the spinal fluid post mortem, where the examination was refused during the life of the patient on the ground that the blood was negative, and I have repeatedly found it positive to the Wassermann, chemical and microscopical examination. In the case of the katatonic, the true picture would never have been revealed had it not been for the extensive bacteriological examination post mortem. phology is not enough to identify an organism. Extensive culturing, before and after death, and a microscopic examination of the tissues at autopsy, with the well-known stains for bacteria, will often yield results in many cases of our so-called dementia præcox. Do not forget to stain for the tubercle bacillus. soon we will come to a splitting of the dementia præcox group, here in America, into a lot of little groups, each on its own etiological basis. The beginning has already been made in splitting off those with a positive Wassermann reaction and other positive tests on the spinal fluid. Who knows how many are caused by influenza or tuberculosis or alcohol?

Beyond this talk of the individual case stands the interest in the group, and for most of us this interest crystallizes into the

demand for the why of the mental picture. Like the why in any question concerned with the human body, we must go for the solution to physiology before we can understand abnormal functionings. The brain is divided into several great regions according to this point of view, and hence our necessary interest in topography. On the mental side, in recent years, great efforts have been made to get at the roots of the ideas entertained by psychopathic subjects. Such efforts have rapidly departed from the teachings of the original founders, and have drifted into a miserable, nondescript state which I have been tempted to call "neo-mysticism." Such a state was far from the minds of the founders, I am sure, for they said, in speaking of hysteria, 59 that the mechanisms which they had discovered could develop only on a constitution predisposed. And I take it that some of our ultra-moderns, even, are coming around that way, for I note that some account for their lack of success with the method by saying that the patient "did not have the 'stuff' in him," meaning by that, I suppose, that the patient was defective from the start. What makes the whole thing so mystical is not that its advocates deny the operation of physical elements, but that they behave as if they did. It is of little moment for one to admit that there is a constitution behind the patient's trouble, if in the next moment he tries to right the patient's difficulty by letting loose some pent-up ideas from the subconscious personality of the individual, such ideas always to be sexual in nature. This I take to be the gist of the difference between "neo-mysticism" on the one hand, and Freudianism of the true sort with its psychoanalytic method on the other. Some writers and workers have come to recognize this difference, and so we see the attempt being made to resolve character into other elements than the sexual alone, and I think a truer picture will be presented — though we run the risk of being suspected of having certain complexes ourselves, you know, by trying thus to avoid the issue.

But what has come out of all this is a method, and the method can be of value to the anatomist. If this method can resolve the faulty character into its elements, and these elements can be correlated with the abnormal functioning of known physiological regions, we have an extremely valuable method indeed. Something of this sort might be expected from the introspective method of experimental psychology. By introspection, under experimental conditions, it is possible to resolve complex feelings, emotions and ideas into simpler elements which are visual, audi-

tory, kinesthetic, etc., but we can never get patients to introspect under experimental conditions. Is not the psychoanalytic method the one to be used in resolving the patient's experiences into elements? Something may also be expected to come from the study of the behavior in the sense used by the experimental psychologist whose special field is the behavioristic side of physiology. But the study of the behavior of an insane individual is aided by the explanations of that individual, if those explanations can be analyzed, and how can they be analyzed at the present time except by the psychoanalytic method? Let us take, for example, the sign so often seen in dementia præcox, confusions of all sorts, and in the deliria, — the removing of the clothing. The patient is said to be denudative. The reasons for the removal of the clothes under improper conditions may be various. One may say it is a sign of exhibitionism; another that the clothes irritate the patient because the skin is hypersensitive; and so on almost ad libitum. But we may gain something if we ask the patient about it. He may give a valuable answer directly, or we may arrive at a valuable conclusion as to the reason by piecing his replies together, as the psychoanalytic method does.

A propos of asking the patient questions, I am reminded of a striking incident which was observed during an intraventricular treatment for paresis. The patient became restless just as the needle was passing through the cerebral substance. Asked what the matter was, the patient replied that he would be all right if the doctor would stop "making his mouth [patient's] fill up with spit," and that his mouth was actually filling up with saliva was not imagination. Beside giving the reason for his restlessness, his reply gave a cue to a second very important point, — that a cerebral injury may affect a gland-secretion. Ceni 59 has also shown changes in the cells of the testicles of roosters by subjecting them to cerebral injury.

The suggestion to use the psychoanalytic method along truly Freudian lines and not in the hazy way in which it is now being applied by his successors, for the most part, should be made now. But the application of the psychoanalytic method in this new way will have to wait until those using it recognize that there is something more beneath character than sex, and that there is something more in personality than character alone. I mean by this that personality includes much more in its connotation than the word character includes. And only when these two are

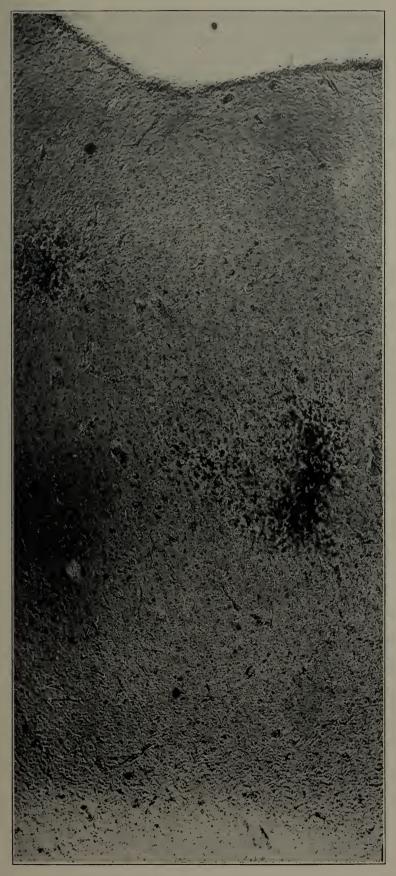


Fig. 1.—Case 1, tubercular paranoid dementia præcox. Cortex of the right superior occipital gyrus, showing two massive processes probably related to the patient's tuberculosis. Section cut 50 micra. Scharlach-R stain. Photograph takes in cortex to white matter.



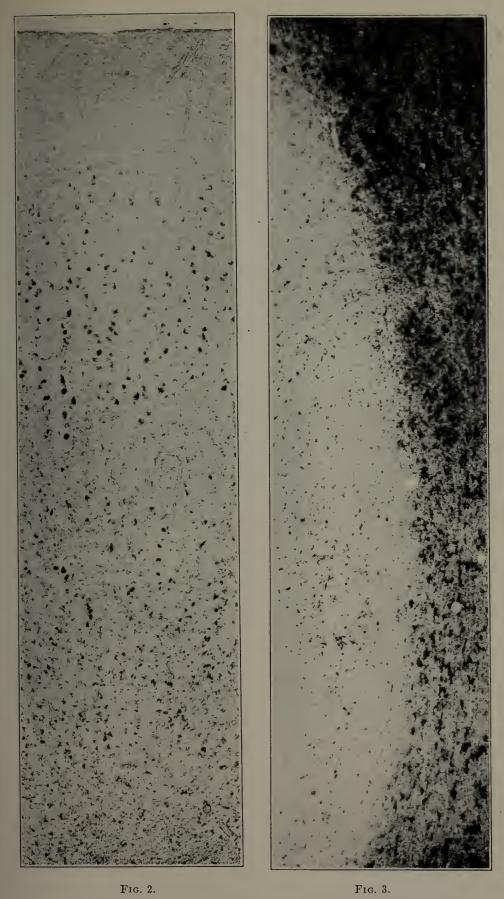
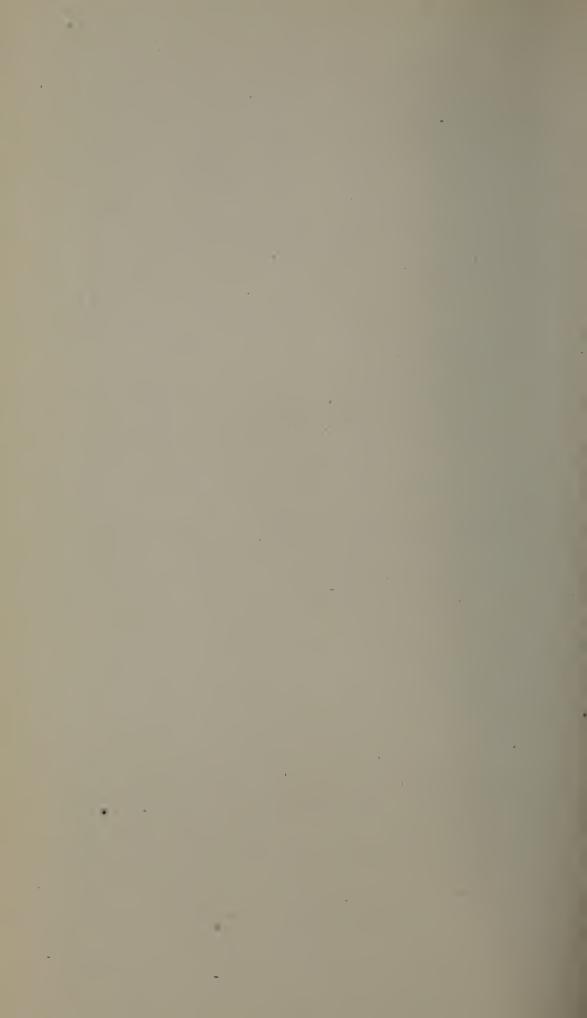


Fig. 2.—Case 2, alcoholic paranoid dementia præcox. Cortex of the left supramarginal gyrus, showing the fat to be chiefly in the outer layers of the cortex. Section cut, stained and photographed as in the previous case.

Fig. 3. — Case 3, paretic-like katatonic dementia præcox. Cortex and white matter of the left lingual gyrus, showing the large amount of fat in the white matter and the small amount in the cortex, with the sharp line of demarcation between the two which appeared in many sections. Staining and cutting same as before, but photograph includes only the white and the cortex at the bottom of a sulcus.



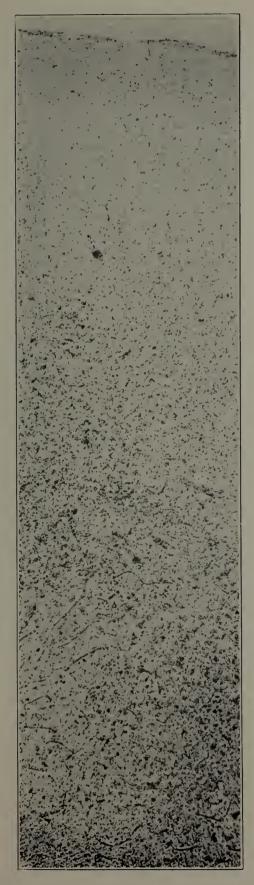


Fig. 4. — Case 4, influenza katatonic dementia præcox. Cortex of the right quadrate gyrus, showing the distribution of the fat in the small elements of the entire cortex, fairly evenly distributed. Staining, etc., as in Cases 1 and 2.



recognized will the psychoanalytic method be of value for the topographical study of the cortex lesions of the insane, and for the correlation of those topographically distributed lesions with the mental picture presented by the patient.

The requisites for future advance, then, are the recognition of unrecognized work, — recognition of the fact that the central nervous system of dementia præcox patients gives evidence of abnormal life processes in the cells; that the same changes are present in the intoxications and the infections, in the confusions and the deliria; that there are methods at hand for diagnosis which are not being used; and that the diagnosis is often difficult and often wrong and will often be wrong when we have exhausted all our methods, but an intelligent attack will have been made.

Conclusions.

- 1. That cases of dementia præcox, of confusional insanity or of delirium, of pseudotumor, and of various other mental conditions have pathological changes which are similar.
- 2. That it is quite \grave{a} propos to assume that certain cases of dementia præcox are due to infectious or toxic processes, in proof of which four cases are introduced, one of which is definitely syphilitic, one is alcoholic and possibly syphilitic, one is tubercular, and one is a case of influenza of fulminating type.
- 3. That cases which can be detected are being missed because of the lack of application of diagnostic methods. As an example, the refusal to permit a spinal puncture where the blood Wassermann is negative is especially decried.
- 4. That topographic studies are next in order as offering a logical direction of research in solving the why of the mental picture, later to be followed by stratigraphic studies.
- 5. The idea is suggested that the psychoanalytic method may reduce the mental condition to elements which can be correlated with lesions topographically or stratigraphically disposed.

In conclusion, I wish to express my thanks to those who have shown their interest in this work, of whom there are many, and also to my laboratory assistant, Julius H. Stean, who assisted materially in making the sections and the photomicrographs.

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A CASE PRESENTING AN EPIDERMOID PAPILLARY CYSTOMA INVOLVING THE THIRD VENTRICLE.*

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GENERAL NEUROPATHOLOGY OF THE CASE.

Epidermoid growths involving the third ventricle have created particular interest with reference to their relation to the pituitary body and the disturbance of its function, the possibility of localization of such tumors, and their source of origin.

Recalling the epiblastic origin of the neural tube, one is not surprised to find, in close relation to the central nervous system, ectodermic cells originally intended for skin and mucous membrane. They may develop as if they were in their normal location with the formation of dermoid cysts or cholesteatomas.

The presence of epidermoid tissue in the third ventricle may be explained as being the result of an infundibular anlage. Cushing ¹ reports two examples of infundibular cysts filled with a yellowish gelatinous substance, and with numerous verrucose nodules composed of squamous epithelium projecting from the walls, which he considers as possible developmental aberrations in relation to the neurohypophysis. Similar infundibular cysts were described by Langer ² and Strada.³

Saxer 4 reported a tumor which he believed originated from the epithelial lining of the ventricle, or the pars intermedia of the pituitary body, the gland being normal.

Mott ⁵ mentions the possibility of epidermoid tissue being transported by the vessels which grew into the third ventricle to form the choroid plexus, also of its having arisen from cells of the hypophyseal diverticulum.

The hypophysis or anterior lobe of the pituitary body originates as a pharyngeal diverticulum (Fig. 1). The exact location of its origin with reference to the juncture of the pharyngeal and buccal epithelium is still a matter of dispute. Minot ⁶ considered the diverticulum an outgrowth from the ectodermal lining of the mouth. Normally, the cells forming the original stalk atrophy

[•] From the Massachusetts State Psychiatric Institute, Massachusetts Commission on Mental Diseases. This paper was one of a series presented to Dr. E. E. Southard on the occasion of the tenth anniversary of the establishment of the Bullard Professorship of Neuropathology, Harvard Medical School, 1906 to 1916.

and the hypophysis loses all connection with the epithelium of the oral cavity. It is not uncommon, however, to have a retention of some cells along the stalk tract, and Erdheim in cross sections of normal glands found inclusions of pavement or ciliated cells near the superior and inferior portions of the hypophyseal cleft and within the gland, presumably representing "rests" of the primitive ectodermic diverticulum. He recorded seven heteroplastic tumors probably arising from such "rests."

Dean Lewis 8 emphasizes the frequency and importance of tumors arising from craniopharyngeal duct epithelium; reviews the literature with special attention to cases reported by Wagner, Langer and Harbitz, and describes a case. He presents a table by Creutzfeldt, published in 1908, showing that in 55 necropsies

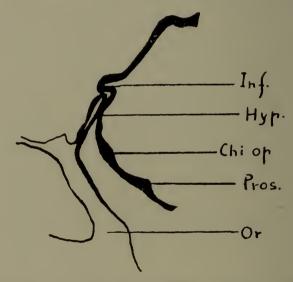


Fig. 1. — Origin of the hypophysis as a pharyngeal diverticulum: Inf., infundibulum; Hyp., hypophysis; Chi. op., optic chiasm; Pros., prosencephalon; Or., mouth.

of tumors of the hypophysis without acromegaly, 19 were classed as craniopharyngeal duct tumors.

In the 30 cases of tumor of the third ventricle reported by Weisenburg, only 3 are stated to be epidermoid in character. These include the cases of Saxer and Mott.

In the case here presented the growth did not show the large polygonal cells with densely staining protoplasm, characteristic of tumors of the pars intermedia, nor did it resemble those arising from the choroid plexus. The infundibulum was distended, and its tissue partially replaced by the tumor with a suggestion of a tumor stalk near the right ventrolateral surface. Cross sections through the third ventricle and pituitary body, which was removed intact still attached to the brain, showed the dura-like

capsule of the growth to be continuous with the connective tissue of the gland. The pituitary gland was normal. The squamous epithelium of the tumor showed a suggestion of intercellular spines and well-marked scaling; but no hair or sebaceous material was found. Vacuolization and cilia formation are not differential, and there does not seem to be any adequate criterion by which one may judge how this epidermal tissue happened to be in this location. From the situation and character of the growth it probably originated either as a result of a developmental abnormality of the infundibulum or from an hypophyseal "rest."

In the grouping of third ventricle tumors according to symptomatology, suggested by Weisenburg 9 in an excellent review of thirty cases of which he reports three, this case would be in Class 1; i.e., those cases in which a tumor of moderate size is situated in the floor of the third ventricle, and in which there is no extension into the foramen of Monro or the aqueduct of Sylvius. Though the aqueduct was not dilated, the posterior part of the ventricle and the peri-aqueductal structures were apparently involved indirectly, as shown by the pupillary disturbance, without, however, paralysis of associated ocular movements and a reeling gait suggestive of involvement of the red nuclei or superior cerebellar peduncles.

The patient's tendency to drag his feet and the weakness of the legs might be interpreted either as evidence of pressure on the internal capsules or of cortical injury.

One of the early symptoms in this case was the evidence of hypopituitarism (loss of sexual power, transient polydipsia and polyuria, and possible gain in weight). These may have been due to the fact that, occupying the base of the third ventricle, the growth at an early date interfered with the discharge of a secretion of the posterior lobe of the pituitary gland directly into the cerebrospinal fluid, or to disturbance of function due to pressure on the whole gland. Histologically, no change was noted.

Another striking feature was the drowsy, somnolent, apathetic condition of over a year's duration, with periods approaching normality. Weisenburg does not consider this feature as specific of lesions of the third ventricle, but due to impairment of the normal function of the cortex, the result of pressure against the skull through dilatation of the lateral ventricles. Mott also believed it to be the result of compression of the cortex by

internal hydrocephalus, and explained the recurrences by the escape of fluid from the lateral ventricles, thereby relieving the cerebral compression and removing the cerebral anemia. Purves Stewart ¹⁰ considered that somnolence in these cases was associated either with direct upward pressure on the third ventricle or with secondary anemia from compression of the vessels at the base of the brain. Turner ¹¹ thought that it was due to cerebral edema. Cushing ¹² notes hypersomnia in many cases of hypopituitarism, and suggests, though certain cases showed sufficient increase in cerebral tension to possibly account for the drowsiness, that the condition may be associated with changes in glandular function. This relation has been considered as an explanation of normal sleep. The case reported by Purves Stewart, in which a sarcoma (extracerebral) destroyed the pituitary gland without clinical evidence of somnolence, is in opposition to this theory.

In the case under consideration there was an internal hydrocephalus with increased intracranial pressure, cerebral anemia, edema and pituitary disturbance; it was not a suitable case for determining whether somnolence is a general diffuse effect, or results from the involvement of a focal center, possibly in the floor of the third ventricle or pituitary body.

The mental condition (change in disposition, enfeeblement of memory, disorientation, untidiness, etc.) is compatible with the fact that the chief gross evidences of pressure were in the prefrontal areas. Sections from the second and third frontal gyri on the left showed loss of myelin in the fibers of the zonal layer. There was a slight diminution in the number of cortical cells, and those present showed considerable chromatolysis.

Areas involved by Tumor. — The tumor directly involved by pressure the gray substance and fiber tracts about the third ventricle, including: —

- (a) The anterior commissure containing fibers between the two hippocampal regions (pars temporalis), and those derived from the lobus olfactorius connecting the olfactory tract on the one side with the hippocampal region on the opposite side (pars olfactoria).
- (b) The fornix composed of fibers arising in the hippocampal region, pursuing an arched course to the corpora mammillaria. Some fibers terminate here, others cross the midline and turn downward into the recticular formation as far as the pons.
- (c) The lamina cinerea and lamina terminalis, a thin layer of gray substance between the corpus callosum and chiasma, con-

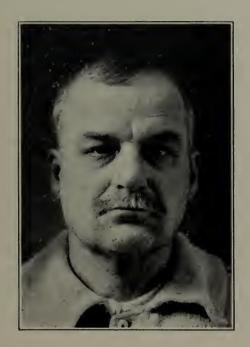


Fig. 2. — Patient, May 10, 1914.

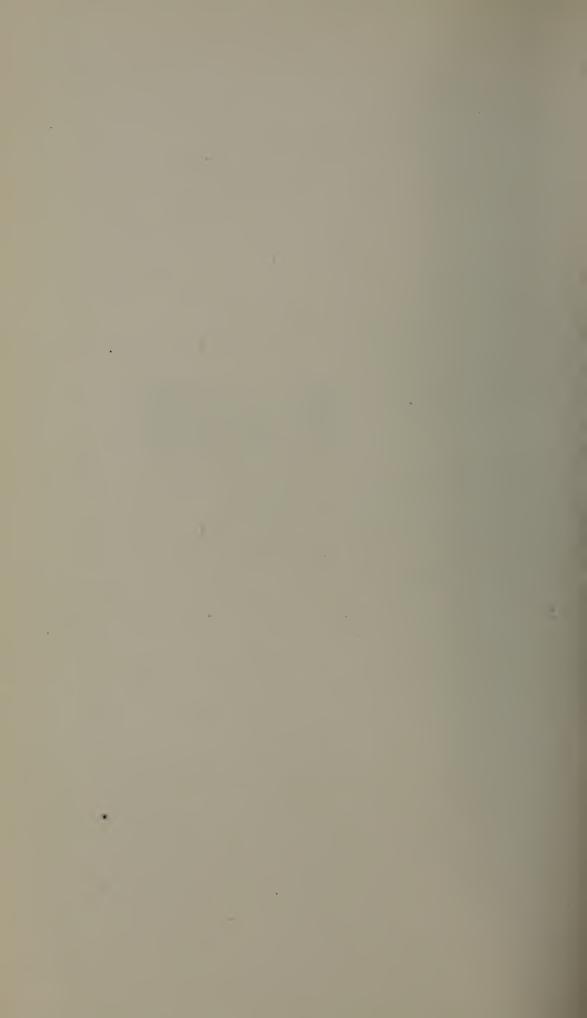




Fig. 3. — Papillomatous character of the growth, type of epithelium and connective tissue stroma. Hematoxylin and eosin, \times 70.

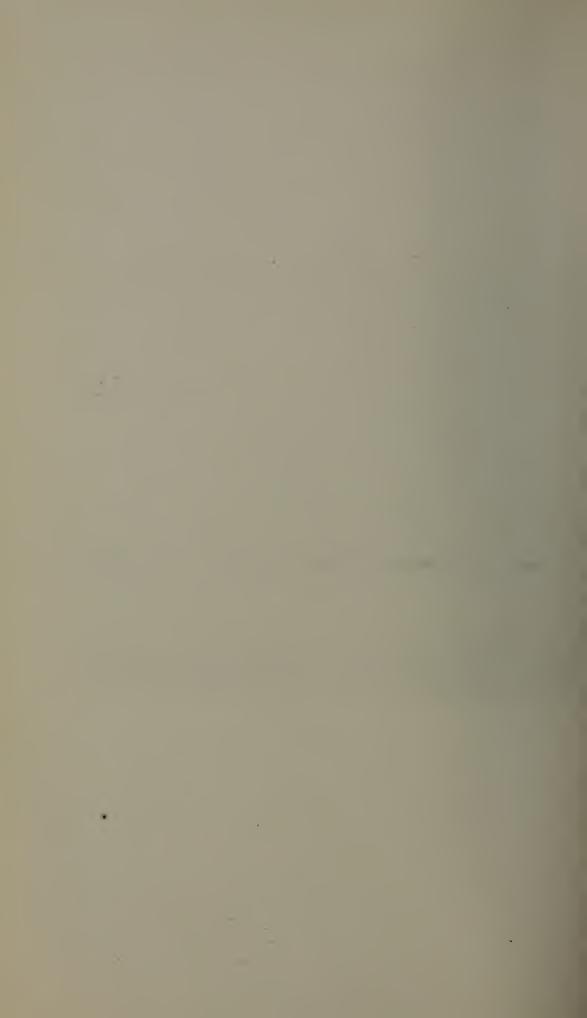




Fig. 4. — Inner aspect of cyst cavity. Hematoxylin and eosin, \times 215.

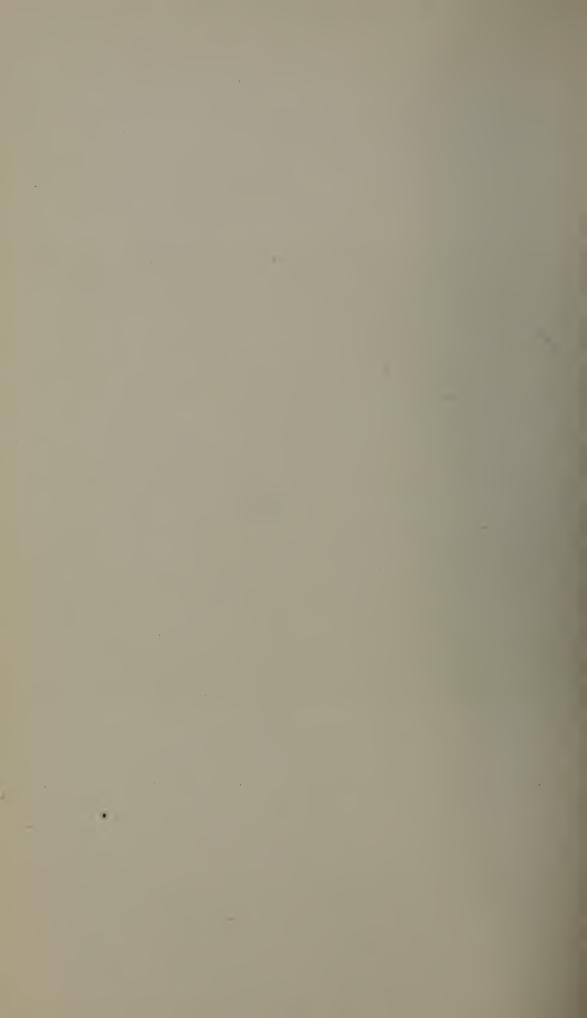




Fig. 5. — Relation of the tumor to the thalamus. Cellular infiltration of the connective tissue. Hematoxylin and eosin, \times 225.

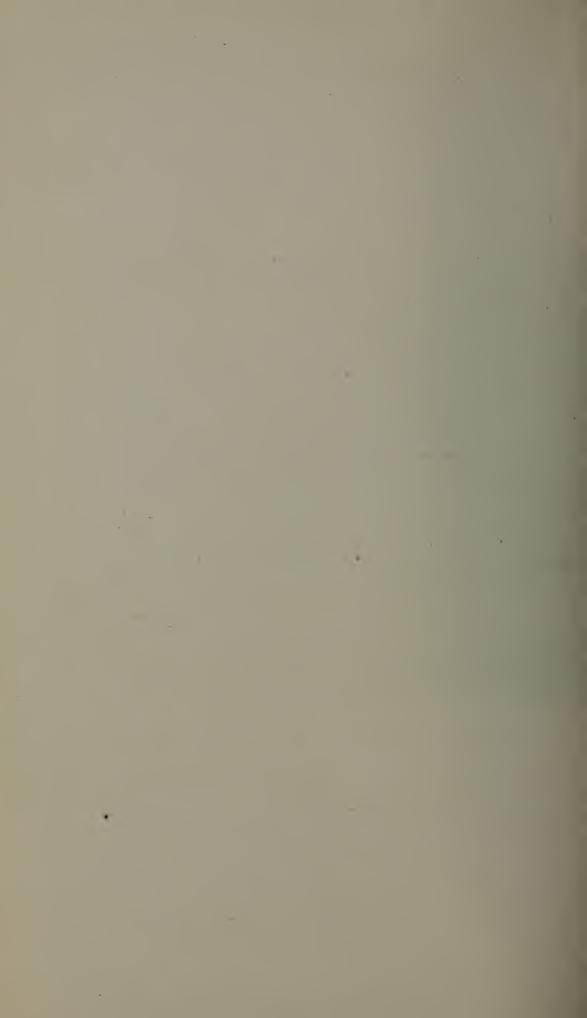




Fig. 6. — Relation of base of growth to the pituitary gland. Globule of hyalin material, Hematoxylin and eosin, \times 23.



tinuous above the chiasm with the tuber cinereum and connected at the side with the gray substance of the anterior perforated space.

(d) The optic chiasm and the optic tract, especially on the left, were distorted and flattened. The disks showed a marked papilledema and deposition of new tissue.

(e) The tuber cinereum — a lamina of gray substance extending forward from the corpora mammillaria to the optic commis-

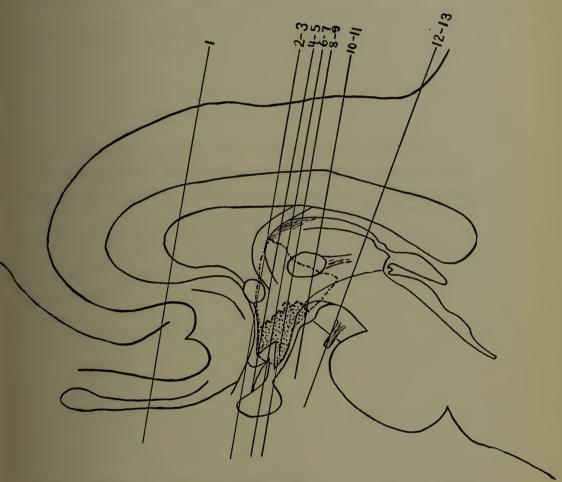


PLATE C. — Diagram of medial sagittal section, showing outline of the cyst and levels at which the following frontal sections were made: -

In plates 3, 5, 7, 9, 11 and 13 one is looking toward the posterior pole of the brain. In plates 2, 4, 6, 8, 10 and 12 one is looking toward the anterior pole of the brain.

sure to which it is attached. It presents several small collections of ganglionic cells; the lateral eminences; the eminentia vascularis, homologue of the saccus vasculosus of lower vertebrates, especially prominent in the fishes. Johnston 13 considers the eminentia vascularis as possibly an organ for controlling the character of the spinal fluid. The basal optic ganglion (supraoptic nucleus Cajal), — a tract of gray matter with nerve cells,

lying to the outer side of the tuber cinereum close to the optic tract. From each a tract issues, which, after decussating with that of the opposite side (Meynert's commissure), applies itself to the mesial side of the optic tract and passes back to the lenticular nucleus (Déjerine).

(f) The corpora mammillaria, especially the mesial nuclei. Efferent tracts: Bundle of Vicq d'Azyr to the dorsal or anterior nucleus of the thalamus; bundle of Gudden to the red nucleus and adjacent gray matter of the tegmentum.

Afferent tracts: ¹⁴ (a) by way of the columns of the fornix, and (b) through its peduncle from the main fillet and arcuate fibers in the tegmentum.

- (g) Posterior thalamic decussation, ¹⁵ behind the mammillary bodies, probably a connection between the corpora Luysii (Déjerine).
- (h) The intermediate gray mass or middle commissure, uniting the mesial nuclei of the thalamus across the third ventricle and continuous below on each side with the gray matter of the cavity.
- (i) The mesial series of nuclei of the thalamus (Cajal). There was no suggestion of a thalamic syndrome in this case.
- (j) Hypothalamus, ¹⁶ the prolongation of the tegmentum under the posterior part of the thalamus, divided by Forel into three layers from above down, the stratum dorsale, zona incerta and the corpus subthalamicum or nucleus of Luys, the latter having taken the place of the substantia nigra lying next to the prolongation of the crusta.
- (k) The internal capsule. The possibility of determining capsular involvement was complicated by the cortical injury.

It has been difficult to estimate the degree of injury suffered by the tissues adjoining the growth, and even more difficult to correlate the injury with any clinical manifestations because of the diffuse area involved and the paucity of data as to the normal physiologic function of the structures.

CLINICAL DETAILS.

The case was under the direction of Dr. Frankwood E. Williams.

History. — The history of the patient, a man, aged 52, white, was obtained from his wife. The family history was not important. He had been subject to headaches and vomiting in early life. At 33 he had typhoid fever. His application for life insurance had been rejected six years before because of albuminuria. He had pertussis in 1913. He

denied venereal disease. He had lost sexual power one and one-half years before. He used no alcohol, and no drugs, but smoked a cigar occasionally.

The patient had been well until August, 1913, when he had occasional severe frontal headaches and complained of not feeling well. During the following months he had frequent headaches accompanied by constant nausea, but not by vomiting; he was abnormally sleepy and extremely irritable. In February, 1914, he drank large quantities of water, sometimes eighteen glasses in an hour; he again became lethargic and confused mentally, but was not considered seriously ill. He gave up his work. In April he was frequently disoriented for time, his memory was poor, and his vision seemed to be failing. His speech became thick; he began to drag his feet, and he developed incontinence of urine.

He was admitted to the Psychopathic Department of Boston State Hospital, May 7, 1914. At first he was excited, tore his blankets and sheets into strips and tied them in a fantastic manner about his feet. He was oriented for person, but not for place or time. There was a marked loss of memory for both recent and remote events with a tendency to fill the gaps with fabrications. He had some delusions of grandeur, magnifying the amount of his wealth and assuring the staff that he built all the buildings around the hospital. Definite evidence of hallucinations was not obtained. Emotionally, he ordinarily had been self-reliant, very cheerful, even-tempered, social (got on well with people), reserved but never seclusive. At the time of examination he appeared self-satisfied, somewhat euphoric and inclined to be restless. He had no insight into his condition.

Examination. — Physical: The patient was a well-developed and well-nourished man, 5 feet 8 inches in height, weighing 203 pounds, stripped. His face was flushed. The general examination was negative except for very slight edema over the feet and shins. The systolic blood pressure was 150 mm. of mercury.

Neurologic: The pupils were central, the right slightly larger than the left, and both were irregular. Consensual reaction and reaction to direct light were sluggish. Accommodation was normal. Extra-ocular movements were normal. There was no ptosis, strabismus or nystagmus. Examination was made of the fundi by Dr. Gerhardt in consultation, May 25, 1914. There was slight hyperemia of the disks, not pathologic. The deep reflexes were normal. Abdominal and cremasteric reflexes were not obtained. The gait and station were normal. There were no areas of anesthesia or hyperesthesia. There was no tenderness over the nerve trunks. Muscle sense was retained except for slight inaccuracy in the finger-to-nose test.

Laboratory Studies. — Urine: An occasional slight trace of albumin and a rare hyalin cast were found in the urine. A study of the acidity by the hydrogen-ion concentration method ¹⁷ gave evidence of a slight acidosis (plus 0.9, two hours after 4 gm. of bicarbonate of soda). The phthalein output was 18 per cent. The time was not stated.

Blood: The Wassermann reaction was negative. The cytologic examination was negative. Quantitative examination of uric acid, urea and non-protein nitrogen showed a nitrogen retention (100 per cent increase over the maximum normal values as given by Folin and Denis ¹⁸).

Spinal Fluid: Three examinations were made. Cells, 2 to 6. Globulin was negative, and albumin was found in small amounts. The Wassermann reaction was negative. The colloidal gold test was negative for syphilis. There was 100 per cent total non-protein nitrogen increase. Urea at the pathologic threshold, based on normal values given by Mestrezat. 19

Head: Roentgenographic examination of the head was negative June 24, 1914.

Course of the Disease. — During the spring and summer the patient remained confused, retarded and apathetic, took no care of his person, was untidy, and was frequently found lying about exposed. In October, because of the slight acidosis shown by the laboratory studies, he was given sodium bicarbonate by mouth. He became oriented for time, place and person; his memory improved, and he appeared to take more interest in current events. There were still periods when he was confused and when he had some difficulty in locomotion. At times he would walk like a drunken man. He had lost 39 pounds. Though not well, he was allowed to go home. In three weeks he returned in a confused state, continually incontinent and very untidy. He remained in bed and refused to eat unless fed. There were a few short periods when he would brighten up and seem to know what was going on about him.

Jan. 3, 1915, after a febrile period of three days (white count 16,800), he became stuporous and died.

Summary. — The patient was a man of 52 years, who had been ill for sixteen months, and whose past history was negative except for typhoid fever nineteen years before and pertussis one year before the present history. There were loss of sexual power; rather acute onset of severe frontal headaches, with nausea but no vomiting; irritability and drowsiness, with increasing mental confusion; transient polydipsia; speech defect; difficult equilibration; disturbance of vision; disorientation; memory defect with tendency to fabrication; expansive delusions; restlessness; untidiness, with a lack of appreciation and indifference to his condition.

Physical Signs: The right pupil was larger than the left. Both were irregular and reacted sluggishly to light. There was a slight speech defect. There were tremor of the extended fingers, increasing weakness of the legs, a tendency to drag the feet, and a loss of control of both the rectal and vesical sphincters.

Laboratory Findings: All tests for syphilis were negative. A slight trace of albumin and casts was found in the urine. There was low kidney function. The blood pressure was 150 systolic. There was retention of

nitrogenous products in the blood and spinal fluid, and an increased white count shortly before death.

The case was presented at a meeting of the staff of the Psychopathic Department May 16, 1914. It created considerable interest and discussion; but no censensus of opinion was reached. It was noted that the case clinically resembled general paralysis; but such diagnosis would hardly be ventured with all tests for syphilis negative. The picture in some respects simulated the terminal stage of Korsakoff's syndrome, but presented no etiologic factor, as alcohol or other toxic agent. No definite indication or localizing sign of arteriosclerosis was present. The evidence of chronic infection, pyogenic or tubercular, was not convincing. Brain tumor was considered; but there were negative eyegrounds, and no localizing signs; an intracranial growth was considered improbable. Although the findings were not typical of uremia, because of the low kidney function, retention of nitrogenous products in the blood and spinal fluid and urinary findings, the case was classified as a cardiorenal psychosis.

Necropsy. — Two hours after death, necropsy was performed by Drs. Solomon, Bunker and Bloomer.

A summary of the positive findings with reference to the body is noted in the anatomic diagnosis.

Kidneys: They weighed 240 gm. They measured 11 by 5 by 2.5 cm. Five small cysts dotted the surface. The capsules were slightly adherent and the pyramids were poorly differentiated.

Thyroid: It was firm, and section showed nothing of note.

Suprarenals: They were very small, the cortex measured 0.1 by 0.2 cm. in thickness. Two lines of the cortex approximated in one limb; the second limb was separated by a brownish medulla which showed a slight hyalin change in one suprarenal.

Pancreas: It was normal. Testes: Threaded well.

Head: Description of the brain is given by Dr. Canavan. The hair was somewhat scant. The periosteum was negative. Calvarium measurements were: frontal, 1 cm.; temporal, 0.4 cm.; and occipital 0.7 cm. Depressions for the pacchionian bodies were slightly to the right of the median line and pierced the inner table at the vertex. Grooving for the middle meningeals was shallow on both sides.

The dura was not adherent, but was tense; and the brain filled the dura completely. Convolutions were seen through the dura. There was no subdural fluid; and on peeling back the dura mater, the pia appeared not to be present, only a tracing of irregularly injected vessels pressed on a smooth brain surface. The pial surface of the brain was dry.

The superior surface of the brain tended to assume a round form when placed on a flat surface. The hemispheres strained from each other. At the frontal poles, particularly on the left, the convolutions were smooth and pressed out in appearance. The sulci were indicated on the right.

The swelling of the brain and the widening and flattening of the gyri were most marked anterior to the posterior lobules. Even the mesial surface showed the flattening of convolutions, especially on the left in the prefrontal region.

At the base of the brain the vessels were small, the vertebral arteries were unequal, the left being larger than the right. There was some hyalin change in the middle cerebrals, but no sclerosis. The middle cerebral artery on the left appeared very small, and its lumen tiny.

The olfactory bulbs were red and slightly unequal; but the tracts were white. There was a sharp differentiation between the bulbs and the tracts.

The optic chiasm was flattened from pressure beneath, especially on the left side, and the form of the optic nerves was much distorted. The optic chiasm measured a little more than 2 cm. from side to side, and spread for a distance of nearly 1 cm. on the left. The tract which leaves the chiasm for the geniculate bodies on the left was broad and thin in appearance from pressure of a swelling from beneath. The distal ends of the optic nerves appeared infringed on and did not assume their round contour, but were irregularly wishbone in shape. The space between the chiasm and the mammillary bodies was translucent gray, it measured 3 by 3 cm., and a puncture of it for securing fluid from the third ventricle showed a thick, purulent, pinkish semifluid substance, a smear from which by Gram's stain, showed many large mononuclear cells with large nuclei; some polymorphonuclears that looked remarkably small in comparison. There were no organisms. When stained by Wright's stain they showed polymorphonuclears (small), red blood cells, and large endothelial and transition lymphocytes. The lobus pyriformis on either side was flattened and thin. The pons measured 4 by 3 cm. and the medulla 2 by 2 cm. The third nerves were involved in a thickening of the pia which forms a part of the floor of the third ventricle.

The optic nerves in their orbital portion showed nothing of note.

The middle ears, Gasserian ganglions and pituitary gland were negative. The brain's weight was 1,575 gm. Tigges' formula 8 by 172: 1,376 gm. The gain in brain weight was 199 gm.

The cord was firm and showed nothing of note.

A frontal section revealed a marked difference in size in the anterior section of the lateral ventricles, the right measuring 4 by 3.5 cm. at the wider end, and 1.5 cm. at the inferior portion. The left ventricle cut at the same plane measured 5.3 by 4.2 cm. at the upper, and 1.5 cm. at the inferior. On cross section of the third ventricle, the tissues were found to be soft and edematous, and the capacity of the third ventricle markedly increased.

Anatomic Diagnosis. — The man was well nourished. There were: injection of appendix; sclerosis of the coronaries and aorta; chronic fibrous endocarditis, tricuspid; chronic fibrous endocarditis, mitral; chronic fibrous endocarditis, aortic; fenestration of the aortic valve; apex

— scar; pulmonary congestion; chronic interstitial nephritis; chronic perihepatitis; a cyst in the liver. The calvarium was thick; the pia dry; the brain was swollen and smooth. Chronic internal hydrocephalus. Chronic cerebral abscess of the third ventricle and hyaline basal vessels were present. The brain weighed 1,576 gm., the gain in brain weight being 199 gm.

Microscopic Findings. — The visceral organs were fixed in Zenker's solution, embedded in paraffin and stained by eosin and methylene blue and Mallory's connective tissue stain.

Kidneys: There was focal infiltration of the interstitial tissue of the cortex by cells of the lymphocytic series. There was a rare sclerosed glomerulus, compatible with a slight degree of chronic vascular nephritis. They were essentially normal kidneys for a man of 52.

Pituitary: There was normal glandular structure.

Testes: The spermatogenous epithelium showed development of spermatocytes and occasional spermatids, but no mature spermatozoa. There was a decrease in the interstitial cells.

Thyroid, suprarenal and pancreas showed no pathologic change.

Spleen: The capsule was thickened. A large amount of intracellular dark brown pigment was present. There was an increase in the connective tissue of the end arteries. Malpighian bodies showed some edema and focal destruction of cells with amyloid deposits.

Liver: Formaldehyd fixation followed by sudan III showed increase of fat in small droplets, chiefly around the portal vessels.

Other organs showed increase in connective tissue around vessel walls. There were a large number of eosinophiles in the lymphoid tissue of the large intestine.

The brain and other nervous tissues were fixed in liquor formaldehyd embedded in celloidin, and stained by the methods of Weigert and Marchi, and with cresyl-violet for cell studies.

Longitudinal sections through the heads of the optic nerves showed the disks to be twice the normal thickness, with retention of a definite cupping but deposition of new tissue. There was slight cellular infiltration along the more minute vessels. The retina showed low folds near the disks. There were distention of the vessels within the optic nerves and marked dilatation of the intervaginal spaces with the arachnoid prominent. Cross section of the left nerve showed a small triangular area with loss of myelin.

Peripheral Nerves: They were negative.

Sympathetic Ganglions: The nuclei were centrally placed. There was peripheral arrangement of the Nissl substance and abundant pigment.

Gasserian Ganglion: The cells were large, and the nuclei were centrally placed. The Nissl substance was finely granular, and evenly distributed through the cells. Few cells showed pigment. The cells were shrunken from the nucleated sheaths.

Cord: Sections from the cervical, thoracic and lumbar regions showed

no loss of myelin. A few of the anterior horn cells at each level were filled with fat in very fine droplets.

Sections of the tumor were stained with cresyl-violet, hematoxylin and eosin, Mallory's phosphotungstic acid hematoxylin, Verhoeff's elastica and Van Gieson.

The cyst appears encapsulated by a supporting layer of vascular connective tissue on which is a stratified epithelium, varying in thickness from a few to many cells with extensive desquamation of the superficial layers. There is a tendency to the formation of prickle cells, but no epithelial fibrils or "pearls." Mitotic figures are not numerous. Though the contour of the infundibulum is essentially retained, its tissue is largely distorted by the growth which fills the cavity and which, in this region, appears as a papillary cauliflower-like mass. On the right ventrolateral aspect there is more abundant vascular connective tissue with radiations into the papillæ suggesting a tumor stalk. There are several finger-like projections and a small cystic protrusion latterly from this area. In the center of the basal proliferation there are a few narrow spaces surrounded by a single layer of large deeply staining columnar vacuolated cells resembling goblet cells, and occasionally a few columnar cells with a suggestion of cilia formation. No hair or sebaceous material was found. The stroma is relatively small in amount, contains numerous blood vessels and in some places is infiltrated with polymorphonuclear leukocytes. a number of finger-like projections from the tumor, but no definite break in the connective tissue capsule was found. The capsule resembles dura in structure, and is continuous with the connective tissue about the pituitary gland which was removed intact with the brain. There are a few hyalin globules just below the growth between it and the gland.

There is some gliosis of the surrounding brain tissue, and there is evidence of retrograde metamorphoses. There are numerous collections of polymorphonuclears and endothelial cells containing fat and pigment. Some areas seem to have undergone a hyalin degeneration.

There are none of the large polygonal cells with densely staining protoplasm characteristic of tumors originating from the cells of the pars intermedia. The growth has not the extensive vascularity or angiomatous character frequently seen with plexus tumors.

Sections from the second and third left frontal convolutions were stained with Weigert, Marchi and cresyl-violet. There is a loss of myelin in the fibers of the zonal layer as compared with Campbell's charts. The cortical cells are slightly decreased in number. The remaining cells appear edematous. Frequent cells show eccentric, poorly staining nuclei and diminution in the Nissl substance. This is more marked in the larger cells. Marchi preparations show an increased fat content in a few of the ganglion cells. There is no phagocytosis.

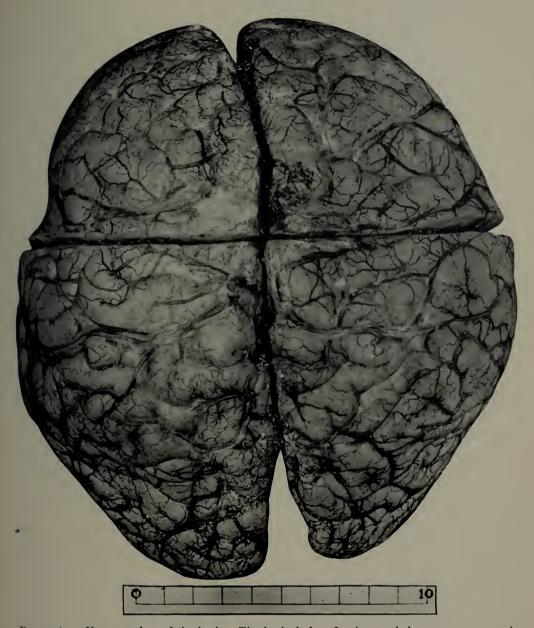


PLATE A. — Upper surface of the brain. The brain before fixation tended to assume a round form when placed on a flat surface. The brain surface was dry, with a tracing of irregularly injected vessels. The convolutions were pressed out in appearance, the sulci being indicated on the right. The swelling of the brain and the widening and flattening of the gyri were most marked anterior to the posterior parietal lobules. The mesial surface also showed the flattening of the convolutions, especially on the left in the prefrontal region.



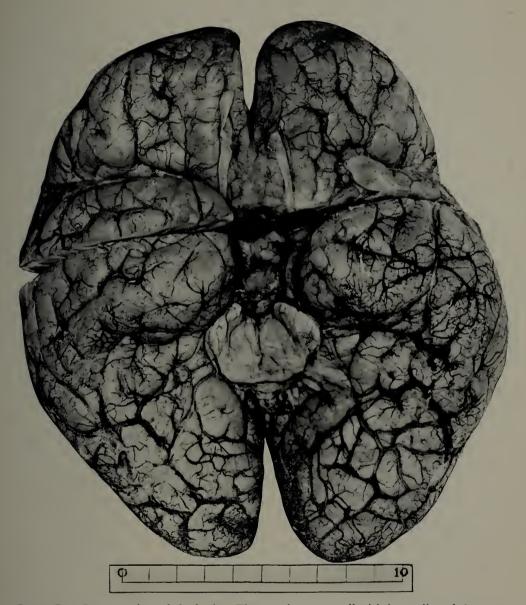


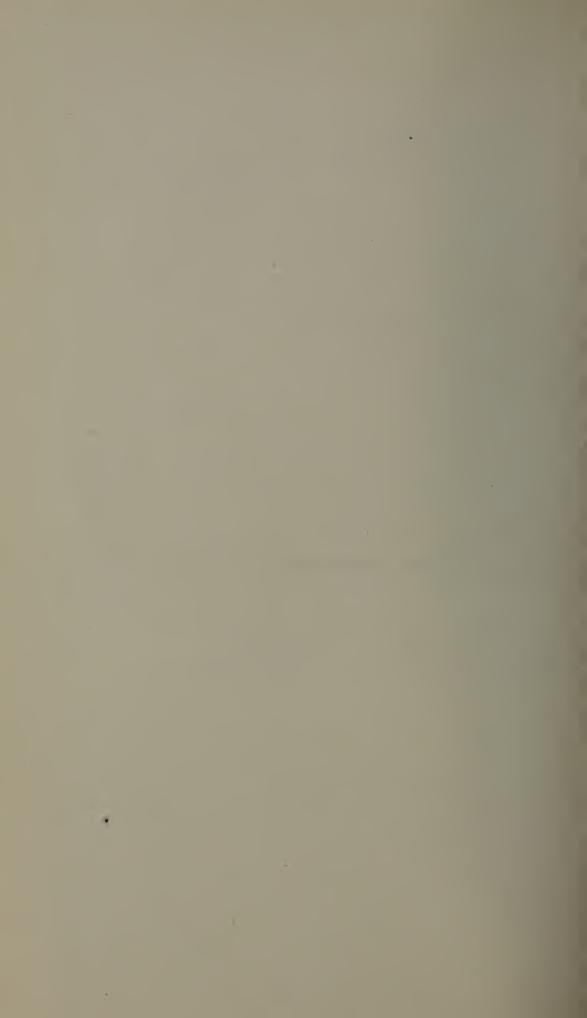
PLATE B. — Lower surface of the brain. The vessels were small with inequality of the vertebrals. The left middle cerebral appeared small, and its lumen tiny. There was some hyalin change in the middle cerebral vessels, but no sclerosis. The olfactory bulbs were red and slightly unequal. The optic chiasm measured 2 by 1 cm.; it was much distorted as though from pressure beneath. The optic tract on the left was broad and bulging, the right less so. The optic nerves were flattened. The tuber cinereum was translucent gray. There was a small nodular protrusion of tissue on the right. The pituitary was normal in size and consistence. There were several grayish yellow spots on the surface. The mammillary bodies were slightly flattened.

The pituitary gland, removed attached to the brain, appeared normal in size and outline.

The mammillary body on the left appeared swollen as though from pressure from beneath.

The third nerves were involved in a thickening of the pia between the peduncles. The brain stem in sections at the level of the red nuclei which appear as circular areas just dorsal to the

substantia nigra and crusta. The cerebellum appeared normal.



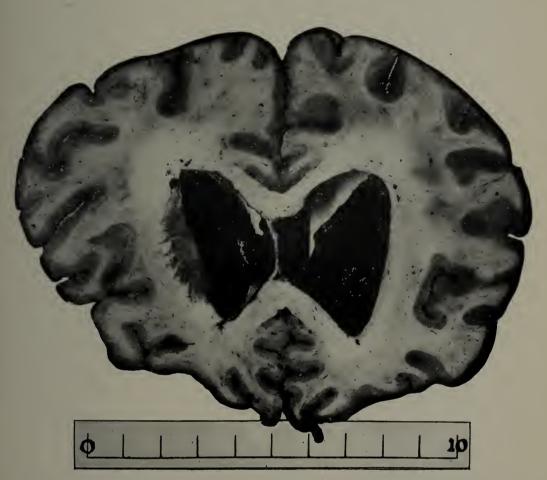
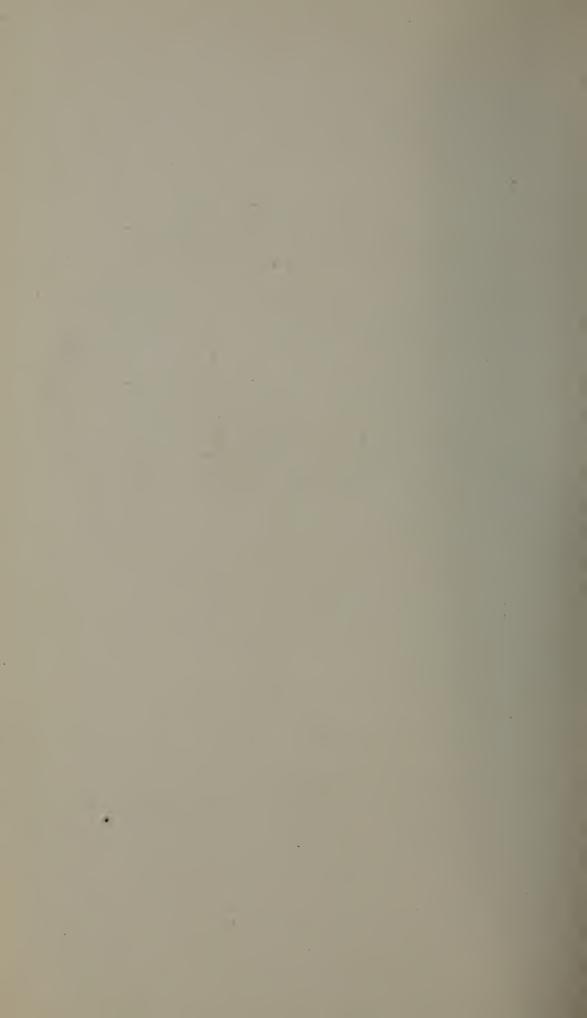
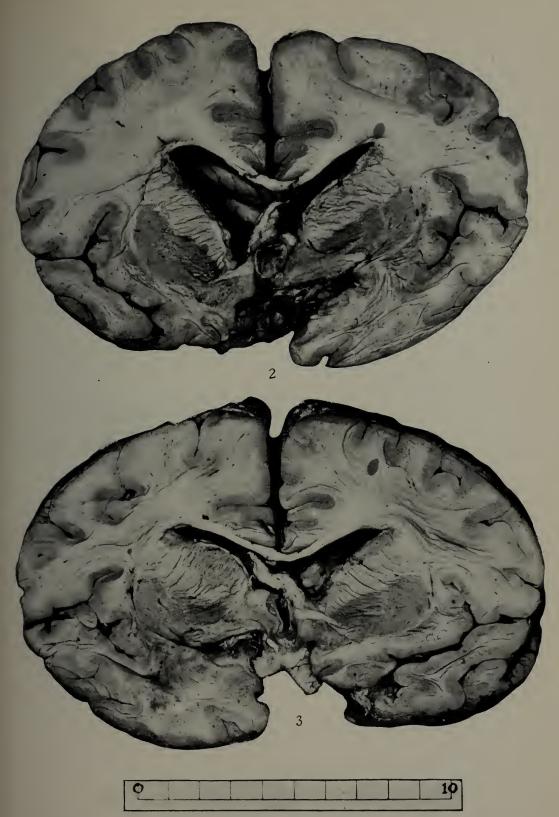


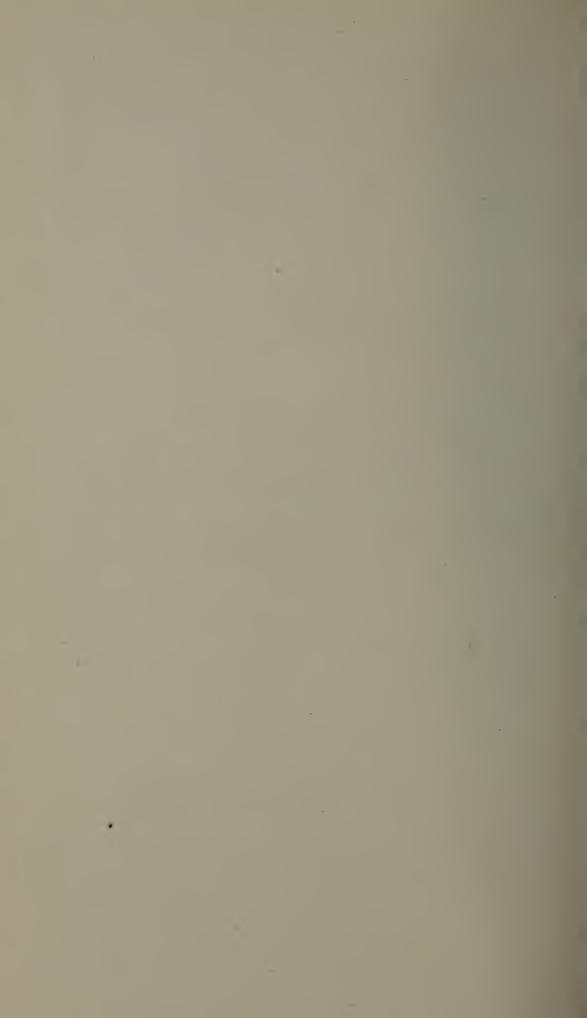
PLATE 1. — Frontal section just posterior to the genu corporis callosis. Slightly oblique. The septum pellucidum extends between the truncus and rostrum corporis callosi. Lateral to the anterior horns of the ventricles is the stratum subependymale, and on the right the corpus striatum before its division into the nucleus caudatus and the nucleus lenticularis by the traversing fiber bundles of the internal capsule. Converging toward the corpus striatum are seen the strands of the corona radiata. The olfactory bulb and tract are folded back beneath the section. The increased size of the left ventricle may be noted.

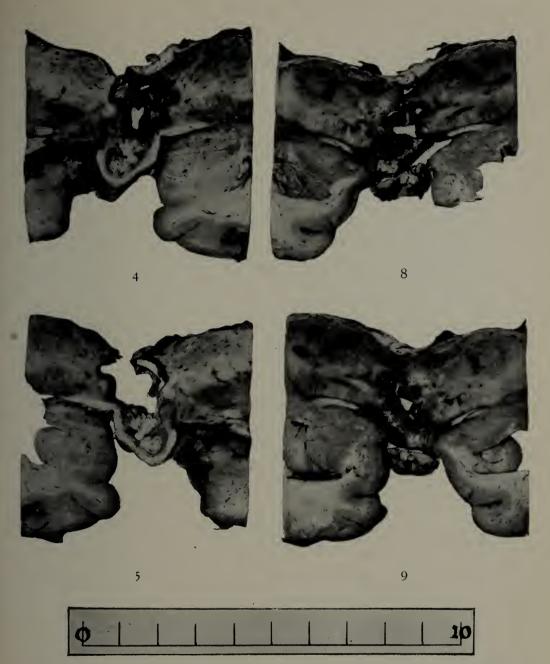




PLATES 2 and 3.—Oblique section. Left side shows more anterior level than the right. The internal capsule appears dividing the corpus striatum into the now small caudate, and the lenticular nuclei. The latter shows a subdivision into the globus pallidus and the putamen. On the right ventral to the corpus striatum lies the substantia perforata anterior, on the left the tuberculum olfactorium. The fibers of the anterior commissure are seen crossing the ventral part of the globus pallidus on the left, more laterally on the right. Ventral to the septum pellucidum appear the fiber bundles of the fornix, more prominent on the left.

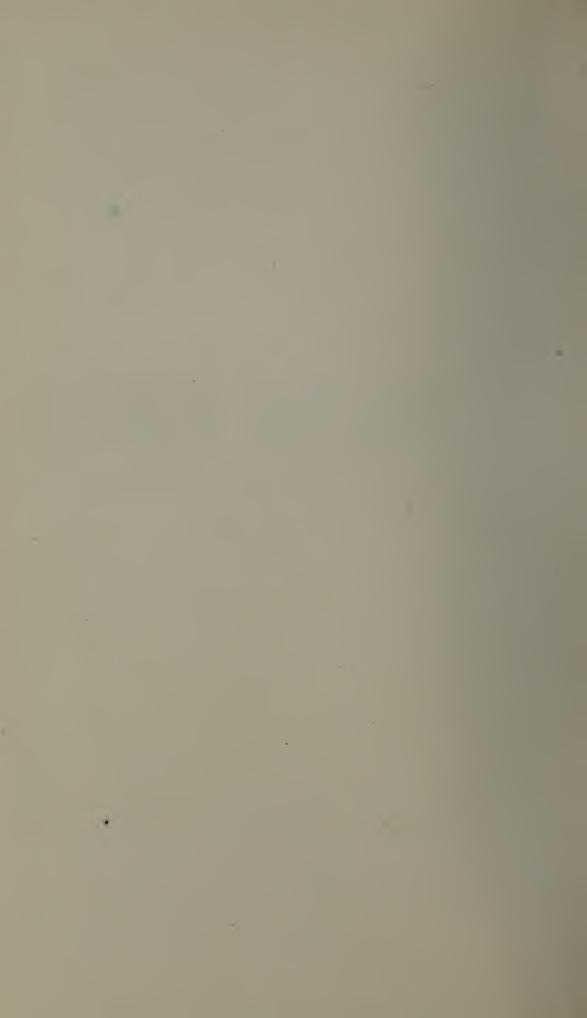
Posterior to the recessus triangularis, rather loosely held to, but distorting, the columnæ fornicis, anterior commissure and lamina terminalis is seen the sacular termination of the cyst occupying the base of the third ventricle. The foramen of Monroe is seen on the left. The increased size of both lateral ventricles may be noted.

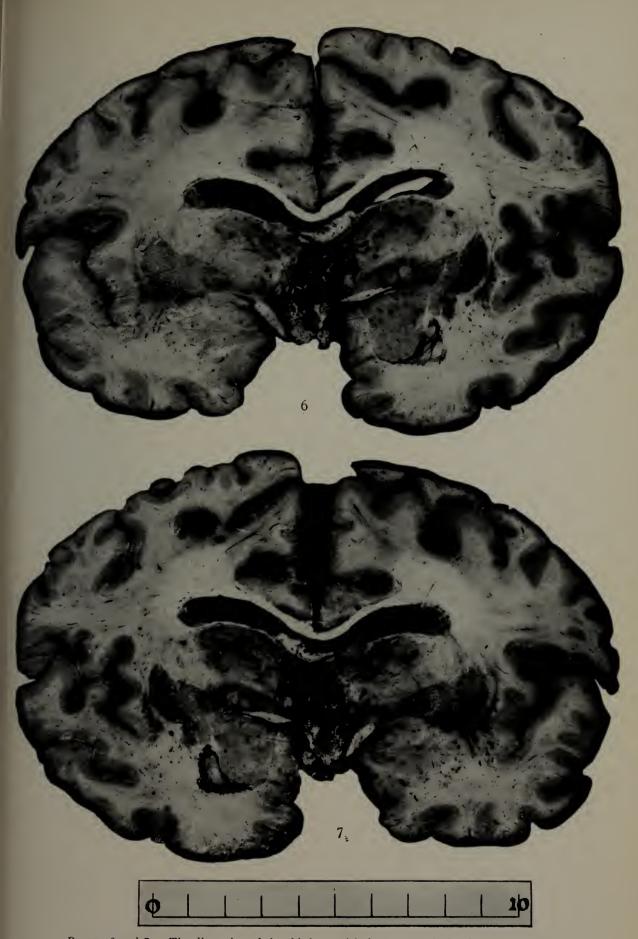




Plates 4 and 5.—On the left the section strikes through the anterior end of the thalamus. The columnæ fornicis lie lower on both sides, while the cruræ assume a dorsal position. Their attachment to the corpus callosum has been torn. On the right, the thalamus exhibits differentiation into the nucleus anterior, and the nucleus lateralis and the nucleus amygdalæ appear within the temporal lobe. The third ventricle is increased in size, irregular in outline and almost completely replaced by the cyst. There is a free upper surface which lies folded on itself across the distended upper portion of the ventricle. The grayish limiting wall can be traced in apposition with the remaining structures about the ventricle. The basal portion of the cyst contains a whitish cauliflower-like growth displacing the fibers of the optic chiasm, more markedly on the left, and causing the rounded swelling of the left optic tract noted in the description of the base of the brain. Around that portion of the growth, extending into the pocket in the optic tract, is a semicircular mass of colloid material.

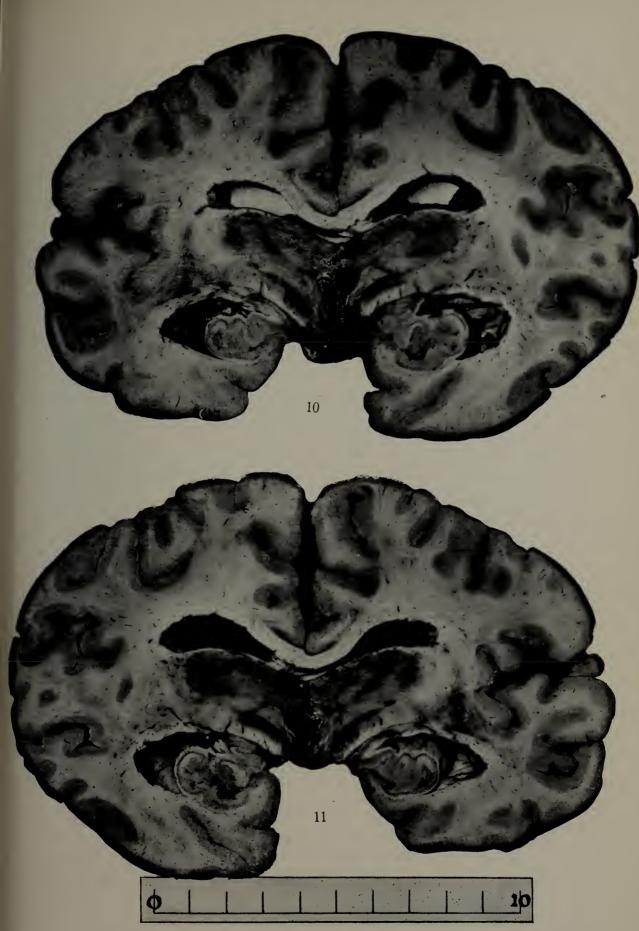
PLATES 8 and 9.— Section passes through the anterior end of the massa intermedia which is flattened by the distention of the third ventricle and pressure of the cyst which protrudes into it from below involving chiefly the mesial nucleus of the thalamus and bundle of Vicq d'Azyr on the right. There is a small pocket between the cyst wall and the overlying commissure on the left. The portion of the third ventricle above the massa intermedia is flattened but patent. The infundibulum is filled with the growth which bulges into the left side. The pituitary in section shows grayish areas. Microscopic preparations were made from this section.





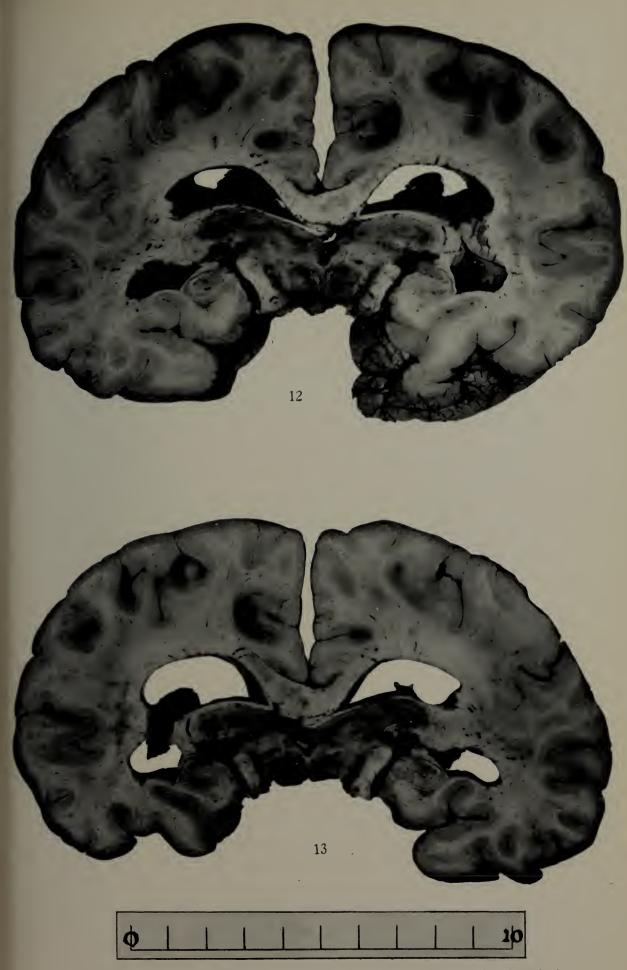
PLATES 6 and 7. — The distention of the third ventricle is more marked; the tumor mass at the base of the cyst now filling the tuber cinereum is larger, and there is a small knob-like extension of the growth on the right. There is marked distortion of the optic tracts. The columnæ fornicis lie deeper. The relation to the thalami, and, on the right, approximation to the internal capsule which now penetrates farther baseward and is traversed ventrally by the fiber strands from the nucleus lenticularis assembling to form the fasciculus lenticularis (Forel) may be noted. Microscopic preparations were made from the anterior portion of this section.





PLATES 10 and 11.—Section passes obliquely through the posterior portion of the massa intermedia and the mammillary bodies. Separating the latter and completely occupying the lower portion of the third ventricle, the cyst is triangular in shape, and there is no growth in the basal portion at this level. The terminal fibers of the fornix are seen entering the lateral nucleus of the mammillary body, and the bundle of Vicq d'Azyr ascending from the mesial nucleus toward the anterior nucleus of the thalamus. Weigert's specimen from the anterior portion of this section shows no loss of myelin in the surrounding structures.





PLATES 12 and 13.—Oblique section behind the massa intermedia and passing through the red nuclei. The posterior portion of the cyst wall is seen in the third ventricle lying below the massa intermedia just anterior to the red nuclei. There is dilatation and flattening of the third ventricle above the massa intermedia. Sections at this level stained by Weigert and Weigert-Pal show no lesion.



SUMMARY.

In this case, presenting an epidermoid papillary cystoma involving third ventricle, the tumor probably originated either from a hypophyseal "rest," or as a result of a developmental abnormality of the infundibulum. The clinical signs and symptoms of sixteen months' duration did not lead to a localization before death. Correlation of clinical and pathologic findings has been complicated by the difficulty of separating local from remote and general effects, and the paucity of data as to the normal physiologic function of the structures involved.

It gives me great pleasure to acknowledge my indebtedness to Dr. E. E. Southard for creating the atmosphere that made this study possible, and for constant stimulating and helpful suggestions.

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ABSENCE OF LOBUS OLFACTORIUS AND SCLEROSIS OF CORNU AMMONIS.*

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Cases showing absence of the olfactory lobe are rare. In 1914 Weidenreich ¹ reported one case and quoted nine others from the literature on this subject. Kundrat, ² in his monograph, "Rhinencephalie," describes brains which have no olfactory lobe, but are combined with other brain anomalies. Besides these two reports I was able to find one case reported by Valenti. ³ But according to Weidenreich all reports which he quoted lack detailed information, especially in that they do not discuss the area of the brain supposedly connected with the olfactory nerve and therefore called "rhinencephalon." Valenti's report contains no statement about this area.

In Weidenreich's Case there was entire absence of the bulbus and tractus olfactorius in both hemispheres. We assume that the rhinencephalon governs the sense of smell as found by Broca and Zuckerkandl in their studies in comparative anatomy, and by Retzius embryologically. If this is true also in man, we should be able to see some change in the parts regarded as the olfactory center in brains that have no olfactory lobe. Weidenreich investigated carefully his case that dealt with the bilateral absence of the bulbus and tractus olfactorius, absence (right) and reduction (left) of the tuber olfactorius. Except for these defects, no parts of the brain regarded as the rhinencephalon showed any marked change which denotes atrophy; but he was not able to study his case histologically because of the unsuitable previous treatment of the material for this purpose. He concludes the question of the olfactory center with the sentence: "Auch die Lösung diesser Frage bleibt also aufgespart, bis der Zufall eine neue Beobachtung des Defectes bringt und zugleich die Möglichkeit einer sofortigen Untersuchung am frischen und entsprechenden fixirten Material."

It is many years since Broca and Zuckerkandl announced that the gyrus fornicatus must be regarded as the cortical olfactory area (it must be understood that under the name gyrus fornicatus

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or rhinencephalon are included gyrus cinguli and gyrus hippocampi with cornu ammonis). Although I am inclined to believe that certain portions of the rhinencephalon govern the smell sense, the part that subserves this function is still unknown, especially in man.

The authors quoted are arranged according to the year of publication.

Examination of animals has convinced Ferrier (cited in Bechterew's paper) that the olfactory center is located at the lower extremity of the temporal lobe. Munk (also cited by Bechterew) seeks it in the neighborhood of the cornu ammonis.

Onodi ⁴ concludes, after investigation of the hitherto published clinicopathologic reports concerning the sense of smell, that the olfactory center might be traced into the gyrus hippocampi and the uncus.

Ramón y Cajal,⁵ from a histological study of the brains of several animals as well as that of man, has reached the conclusion that the focus spheno-occipitalis, the subiculum, the focus praesubicularis and the cornu ammonis seem to have no direct connection with the olfactory nerve fibers, and that they probably represent the tertiary olfactory center.

Campbell,⁶ chiefly from histologic study of the human brain, recognizes the cross relation between the lobus pyriformis (frontal pear-shaped part of the gyrus hippocampi) and the cornu ammonis, but he doubts whether Ramón y Cajal is right in regarding the latter as a tertiary olfactory center. One of his conclusions is, "Histology supports comparative anatomy in suggesting that in the human brain the lobus pyriformis must be regarded as the principal cortical center, although not the sole one governing the olfactory sense."

Brodmann ⁷ distinguishes the gyrus hippocampi from the surrounding areas on the ground of the histologic construction, and names it "area ento-rhininalis."

Bechterew ⁸ concludes, from the results of experimental investigation on sixteen dogs, that an olfactory center is located apparently in the lobus pyriformis, and that this must be regarded as the perception center for the sense of smell, while perhaps the neighboring region (subiculum cornu ammonis, Bechterew) may have the function of its conception.

Edinger 9 seems to approve the cornu ammonis for this center chiefly from the comparative anatomic standpoint.

As I have mentioned above, our knowledge of the olfactory

center is limited. Campbell declared, after covering the histologic evidence: —

Above all things we seem to lack the knowledge which in the case of some other cortical regions has proved so valuable. I refer to that derived from studies in pathological history; for instance, we have much to learn of the cortical changes attending uncomplicated atrophy or lesion of the olfactory bulb and peduncle, and have virtually no conception as to what subdivisions such changes would be distributed over.

Fortunately, through the generosity of Dr. Southard, I was permitted to investigate a brain that had no olfactory tracts. I will give the macroscopic and microscopic findings of this rare and interesting case, describing particularly those parts of the brain which have been suggested as having intimate connection with the olfactory sense. I shall endeavor to throw some light on the question of the olfactory center which seems to be so obscure.

REPORT OF A CASE.

History. — F. S. H. 228, S. B. I. 1916. 87 (from the record of the Foxborough [Mass.] State Hospital), R. R., a man, aged 45, had epileptic dementia, the probable cause of which was heredity. The psychosis had been of gradual onset and of over fourteen years' duration, and had been characterized by periodic attacks of an epileptiform nature during which the patient lost consciousness, had generalized clonic convulsive movements, bit his lips and tongue and had loss of sphincter control. Following these attacks the patient was weak, befogged and depressed. He also had periods of depression and at times of excitement, auditory and visual hallucinations, with delusions of persecution. His judgment and emotional fields were markedly impaired, and there was general mental deterioration with no insight. He was admitted to the hospital April 17, 1907, and died July 13, 1916. Necropsy was performed by Dr. M. M. Canavan eleven hours after death.

Anatomic Diagnosis. — This included brown atrophy of the heart muscle; ascites; calcified lymph node in mesentery; bladder distended; chronic perisplenitis; sclerosis of the mammary arteries; hydrothorax; hydropericardium; sclerosis coronaris; tricuspid and mitral stenosis; chronic fibrous endocarditis, mitral; chronic fibrous endocarditis, aortic; acute vegetative endocarditis, aortic; possible bronchopneumonia; pulmonary infarcts; accessory spleen; uric acid deposits, kidney (?); pigmentation, fibrotic spots; focal opacities, pia; absence of lobus olfactorius; soft cerebellum.

MACROSCOPIC STUDY OF THE BRAIN.

In general form and size the brain was about normal. The pia mater showed focal opacities in the frontal and motor regions, and was non-adherent. The gyri in general were of normal richness and appearance and almost symmetrical. On the base of the brain the absence of the bulbus and tractus olfactorius first attracted our attention (Fig. 7). There was slight sclerosis in the basal arteries. On careful stripping of the pia mater the findings in the rhinencephalon were (the nomenclature in the following description has been adopted chiefly from Retzius ¹⁰):—

Right Hemisphere. — The weight of the right hemisphere after hardening in formaldehyd was 604 gm. The bulbus and tractus olfactorius were absent. Corresponding to the area of the trigonum olfactorium a flat and small pyramidal pointed process could be seen; both its sides and tip were free, but the brain substance beneath adhered to its base. The tip of this process rested in a rudimentary sulcus olfactorius; no filia was to be seen. A rudimentary sulcus olfactorius ran forward from the top to the process described above for about 1.7 cm., and divided into two short transverse branches. As far as this sulcus extended a gyrus rectus could be distinguished, but at the end of the sulcus the gyri were bounded by a short transverse gyrus. Gyrus tuber olfactorius, gyrus olfactorius medialis and lateralis were not definite. Along the posterior ends of the gyrus rectus and gyri frontales a narrow convolution, a continuance of the area parolfactorici on the mesial surface, ran transversely into the limen insulæ and separated the surface connection between the frontal lobe and the anterior perforated substance. The space of the latter was narrow. No stria of olfactoria was to be seen. parolfactorius anterior connected upward with the sulcus cinguli, and by the sulcus parolfactorius we could distinguish area parolfactoria and gyrus subcallosus, both pointing upward to gyrus cinguli (Fig. 2). The gyrus hippocampi was bounded anteriorly by incisura temporalis, above by the fissura rhinica in its anterior portion, and by sulcus collateralis on the posterior border; its length from the frontal tip to gyrus rhinencephalolingualis was about 4 cm. and seemed a little atrophied. From the inner sides of the hemisphere in which the crus cerebri was cut off could be seen clearly the whole length of the fascia dentate and the fimbria, and a part of the fornix through the dorsal surface of the gyrus hippocampi, with no pressing up of the thalamus.

gyrus semilunaris, sulcus semiannularis, gyrus ambiens and sulcus rhinica inferior, which Retzius noted especially in the gyrus hippocampi, were easily identified. The uncus was well developed and bent sharply against the gyrus hippocampi as usual. The gyrus fusiformis was separated from the former gyrus by the fissura rhinica in its anterior portion, and posteriorly by sulcus collateralis, with the exception of a narrow communication, gyrus rhinencephalofusiformis, located between the former fissura and the latter sulcus.

At its posterior extremity the gyrus hippocampi joined with the gyrus cinguli by gyrus rhinencephalolingualis, with gyrus cinguli and also with the precuneus by the isthmus cinguli as well as by precuneus anterior. The sulcus cinguli as the continuation of the sulcus parolfactorius anterior at its frontal end ran upward then backward around the genu corporis callosi and joined with the sulcus paracentralis, which separated lobulus paracentralis and precuneus. The gyrus cinguli was well developed and separated from the neighboring gyri by sulcus cinguli and subparietalis, from the corpus callosum by sulcus corporis callosi. Its frontal end communicated with area parolfactoria and gyrus subcallosus; its posterior part was joined to the gyrus hippocampi. In the commisura anterior there was no notable change.

Left Hemisphere. — The weight of the left hemisphere after hardening in formaldehyd was 607 gm. The bulbus and tractus olfactorius were absent. In the place of the trigonum olfactorium there was a process of pyramidal form about the size of a kernel of corn, but it was not so flat as that of the right hemisphere; its tip was slightly free, but the other parts adhered to the frontal lobe beneath. Gyrus tuberis olfactorii, gyrus olfactorius medialis and lateralis could not be differentiated: neither could the filia nor the stria olfactoria. The gyrus rectus could not be differentiated from the gyri frontales, and a sulcus olfactorius did not exist. The space of substantia perforata anterior was narrowed and separated from the orbital surface by a sulcus which ran from the mesial surface as the continuation of sulcus parolfactorius posterior. The gyrus hippocampi was 5 cm. long from its frontal tip to the gyrus rhinencephalolingualis, and was bounded from the gyrus fusiformis by the sulcus collateralis. The fissura rhinica, gyrus semilunaris, sulcus semiannularis, gyrus ambiens and sulcus rhinica inferior could all be recognized. Generally the gyrus appeared to be a little atrophied, especially on the dorsal surface near the fissura hippocampi, where the convolution flattened, and clear strands of the fascia dentata, fimbria and a part of fornix were to be seen from the inner sides of the hemisphere (Fig. 3). The sulcus cinguli, beginning as the continuation of sulcus parolfactorius anterior at its frontal end, ran as usual almost parallel to the corpus callosum and combined posteriorly with the sulcus paracentralis. Gyrus cinguli, bounded superiorly by the sulcus cinguli and sulcus subparietalis, and below by the sulcus corporis callosi, was well developed, and its posterior end reached to the isthmus rhinencephalolingualis as usual. The anterior end of the gyrus cinguli joined below to the area parolfactoria and gyrus subcallosus, which were as well developed as those of the right hemisphere.

HISTOLOGIC STUDY.

Although there is no definite proof of the location of the olfactory center in the human brain, it is not difficult to assume that either the gyrus hippocampi or the cornu ammonis may govern the function. Therefore I made it my chief object in the microscopic study to examine these two regions. I took out the whole gyrus hippocampi with the cornu ammonis and the fascia dentata from both hemispheres. I investigated the fine construction and the lamination of nerve cells by the cresyl violet stain in paraffin sections, the arrangement of nerve fibers by Kulschitzky-Wolter's modification of Weigert's myelinsheath stain in celloidin sections.

To obtain exact results I prepared as many serial sections as possible, and in order to avoid any misjudgment by comparison I investigated by the same methods the same regions of four other specimens which I had obtained from four normal looking hemispheres. I also examined other important areas of the brain.

Gyrus Hippocampi. — Cajal and Campbell have studied the normal histology of the gyrus hippocampi in detail. I state the findings in my case chiefly according to the topographical subdivisions by Ramón y Cajal, at the same time taking into consideration Campbell's description.

(a) The subiculum plexiform layer was about of normal thickness deep in this layer islets composed of numerous minute triangular cells were seen as usual. Four or five of them were found in a section of the frontal area, but much fewer in the posterior area. The pyramid and polymorphous cell layers were narrowed, and many nerve cells, especially the pyramidal cells, were moderately shrunken with more or less affected nuclei.

There was no change in the lamination, and the cells were arranged in regular parallel rows as usual. Glia cells seemed to be increased.

- (b) Præsubiculum: The tangential fibers in the plexiform layer ran irregularly; some were swollen and pear-like in appearance. The thickness of the gray matter beneath was reduced, and many nerve cells, especially the pyramid cells, were moderately shrunken, but we were able to recognize the small pyramid and fusiform cell layer, the deep plexiform layer, the medium-sized and large pyramid cell layer, and the fusiform and triangular cell layer, as described by Cajal.
- (c) The Hippocampal Gyrus Proper: The tangential fibers in the plexiform layer ran irregularly, and were much fewer than normal. In the layer containing a cluster of polymorphous cells, the clusters of large polymorphous cells which characterize this area of the gyrus were to be found at the lobulus pyriformis, less toward the posterior end, but their protoplasm as well as their nuclei were markedly shrunken. The deep plexiform layer or medium-sized pyramid cell layer, the large pyramid cell layer and the fusiform and triangular cell layer could all be differentiated, but many nerve cells, especially the pyramid cells, were considerably shrunken. As a whole, the cortex was narrowed. In Weigert's slides there was no notable change in the arrangement of the radial fibers in the gray matter, but the interradial fibers among the former were few in comparison with those in brains having olfactory tract intact.

Cornu Ammonis and Fascia Dentata. — The histology of these organs in the human brain has been studied carefully by Kölliker, and Doinikow, in his study of comparative anatomy, agrees with Kölliker.

(a) The Cornu Ammonis: The small size and the marked narrowing of the gray matter were noticeable at the first glance (Fig. 4). The microscopic investigation of the sections disclosed: the stratum zonale was about normal in thickness; the superficial tangential, middle longitudinal and deep tangential fibers could be differentiated. The glia cells were increased and the moderate thickening of the wall of the blood vessels was visible. The cell layer, stratum cellularum pyramidarium and stratum oriens were markedly narrowed as we recognized with the naked eye, and it was a striking fact that the pyramid cells which characterized this layer by their large size as well as by their number were not only much reduced and atrophied (Fig. 6), but in some

positions they had entirely disappeared, and these gaps of the cell layer were filled with neuroglia (Fig. 8). Many of the pyramid cells in this layer were also markedly shrunken: their Nissl's bodies could not be differentiated and their nuclei had disappeared. Such changes of the nerve cells could be seen through the whole cornu ammonis; generally they were more noticeable in its dorsal plate than in its ventral, and they were most striking in the terminal plate, as seen in Figs. 9 and 10. In the area near the gaps described the change of the pyramid cells was also remarkable, and in these situations the several stages of the cell alterations could be seen; some of them maintained their cell bodies only as a thread-like shell, while others kept their pyramid form with more or less affected protoplasm and nuclei. The favorite locations of the gap seemed to be the transitional regions of each plate into the other, and as far as I examined I found two spaces in the frontal part of the left cornu ammonis, and individual spaces in the frontal and in the middle part of the other.

In Weigert's stain not only could the narrowing of the layer of gray matter be seen clearly, but places in which the gray matter had almost disappeared and nerve fibers were pressed together as if they connected the stratum zonale with the alveus crosswise could be seen (Figs. 4 and 13).

The Alveus: This was about normal in thickness or thicker than normal along the dorsal plate; it divided into two branches as usual — the superficial branch went into the fimbria without notable alteration, but the nerve fibers of the deep branch which spread among the nerve cells in the terminal plate of the cornu ammonis were few and fine in comparison with those of the normal sections (Figs. 15 and 16).

(b) The Fascia Dentata and the Fimbria: In the stratum zonale nothing important was found.

Stratum Granulosum and Stratum Polymorpheus: The form and fine construction of each cell, as well as the number in a row, were about normal except in one area in which the ventral portions approached the surface; in this lesion many of the cells were moderately shrunken with alteration in their nuclei.

The Fimbria: There was no noticeable change in the fimbria, except that there were many blood vessels with thickened walls among the bundles of nerve fibers.

Other areas of the brain investigated were: the gyrus cinguli, gyrus temporalis superior, gyrus frontalis superior, gyrus centralis anterior, gyrus centralis posterior and gyrus occipitalis superior.

Speaking generally, the changes which I recognized in these areas, so far as I examined them, were the moderate thickening of the plexiform layer, more or less shrinkage of nerve cells in the gray matter, and light thickening of the wall of the blood vessels.

SUMMARY.

There were bilateral absence of the bulbus and tractus olfactorius, rudimentary development of the trigonum olfactorium in both hemispheres, absence (left) and partial development (right) of the sulcus olfactorius, non-development of the gyrus olfactorius medialis and lateralis as well as of the gyrus tuberi olfactori in both sides, absence of the stria olfactoria, and some atrophy of the gyrus hippocampi in both hemispheres. The other areas, which are regarded as the rhinencephalon, showed no notable alteration.

Comparing this case with that of Weidenreich's, I find that there is no great difference between the two cases except in the incomplete development of the sulcus olfactorius and the atrophy of the gyrus hippocampi in my case.

As already mentioned, Weidenreich is of the opinion that, although the question of the olfactory center has not been solved by his case report, because no macroscopic change was to be seen in the rhinencephalon, perhaps the olfactory nerves connected the center in some irregular way, as the patient seemed to have had some sense of smell during life.

In my case the absence of the gyrus olfactorius medialis and lateralis, as well as of the gyrus tuberis olfactorii and the stria olfactoria, — which were also lacking in Weidenreich's Case, — would not be of importance in regard to the question of the olfactory center because the development of these gyri and stria depends directly on that of the bulbus and tractus olfactorius.

The flattened gyrus hippocampi, which I have described, attracted my attention in this case, and it would be interesting to know whether this atrophy in the rhinencephalon is to be regarded as the result of the absence of the lobus olfactorius. It is to be regretted that I could not get any positive information about the sense of smell of the patient during life. Such an important question could not be solved by the macroscopic investigation alone, and therefore I discuss it later in reference to the microscopic findings.

Concerning the origin of the defect of the olfactory lobe, according to the description by Ernst, ¹³ arhinencephaly, a brain without

an olfactory lobe, may develop when some compression acts on the head fold of the embryo. Schwalbe ¹⁴ states that the theory of compression as the cause of arhinencephaly and cyclopy has been shaken, and the opinion that it is due to some embryonal defect is gaining more general acceptance.

Weidenreich is of the opinion that in his case the olfactory nerve could not combine with the olfactory lobe as usual, and consequently the latter was deserted to atrophy. The full development of the sulcus olfactorius in his case shows that the olfactory lobe might have been developing for some time. He seeks the origin of the anomaly in some alteration of the embryonal connective tissue.

In the present case the sulcus olfactorius did not develop so fully, but, in accord with Weidenreich's, the main anomaly has been limited to the lobus olfactorius with no remarkable change in the neighboring areas of the forebrain. This is not to be explained by the compression theory, for if so, it must have been circumscribed as well as effective, and at the same time it must have acted on both hemispheres; but such a compression is not to be considered. I would not hesitate to believe that the defect of the lobus olfactorius might have had its origin in some defect in the embryonal tissue.

In the microscopic investigation the changes were found in the cornu ammonis. There were marked reduction in the gray matter, remarkable atrophy of pyramid cells and disappearance of the cell layer in some portions, fewer nerve fibers in the deep branch of the alveus, more or less increase of glia cells and thickenings in the walls of the blood vessels.

I believe that the change of the nerve cell denoted atrophy and not aplasia because the alteration was not the same through the whole cornu ammonis, and, moreover, several stages of the change in the cells were seen.

Next to the cornu ammonis the change in the gyrus hippocampi was most noticeable. The changes in this region were: less tangential fibers in the plexiform layer, marked atrophy of the superficial large polymorphic cells, moderate shrinkage of the pyramid cells and loss of the interradial nerve fibers.

It is interesting that to some extent these findings in the gyrus hippocampi accord with the result of the macroscopic investigation, which showed some atrophy of this gyrus. Moreover, it is extremely interesting to have found the most marked change in the cornu ammonis in my case, while the location of the

olfactory center is still a question, and some authors, notably Ramón y Cajal, are suggesting the cornu ammonis as the terminal station of this sense.

According to His, quoted in Weidenreich's paper, the olfactory nerve develops separately from its central part, and the connection with the brain is accomplished in a comparatively later stage. Therefore, it would not be unreasonable to expect some secondary change in the olfactory center, although it might have developed as usual. In this case, in which there were no bulbus and tractus olfactorius, the cornu ammonis showed the most marked alteration in the so-called rhinencephalon.

Besides the anomaly of the olfactory lobe are there any other possible causes for this change to be considered?

Arteriosclerosis may be taken into consideration, as the thickening of the walls of the blood vessels was noted in the cornu ammonis; but the patient did not have marked arteriosclerosis, and the basal arteries showed only a slight degree of the hardening. Hence an intense alteration in nervous tissue could not be explained by arteriosclerosis; moreover, the change in the nervous tissue was almost limited to the cornu ammonis.

Certain intoxications may be considered, but in the clinical history there is no evidence of any kind of intoxication as a probable cause of such a change in the nervous tissue. General intoxication would not cause the most marked change in the cornu ammonis; hence this cause may also be excluded. May I then conclude that I have eliminated doubt regarding the olfactory center, and that the cornu ammonis must be regarded as the terminal olfactory center?

Unfortunately, the patient suffered from epilepsy of long duration, as briefly described in the history. Since the sclerosis of the cornu ammonis in epilepsy was called to attention by Meynert, Sommer, ¹⁵ Bratz, ¹⁶ Arzheimer, ¹⁷ Worcester ¹⁸ and Southard ¹⁹ by histologic studies on this subject, I shall not give the results of the investigations of each one of these authors. It seems to be true that in several cases of epilepsy discussed by these physicians, some alterations — especially atrophy of pyramid cells, increase of glia cells and sclerosis of blood vessels — were found in the cornu ammonis. This complicates the value of similar findings in the present case, as the defect of the lobus olfactorius cannot be excluded as a possible cause of these changes in the cornu ammonis. A discussion as to which of the two possible causes is more reasonable or was more effective in

this case should be avoided, as any conclusion in this discussion appears to be only an assumption.

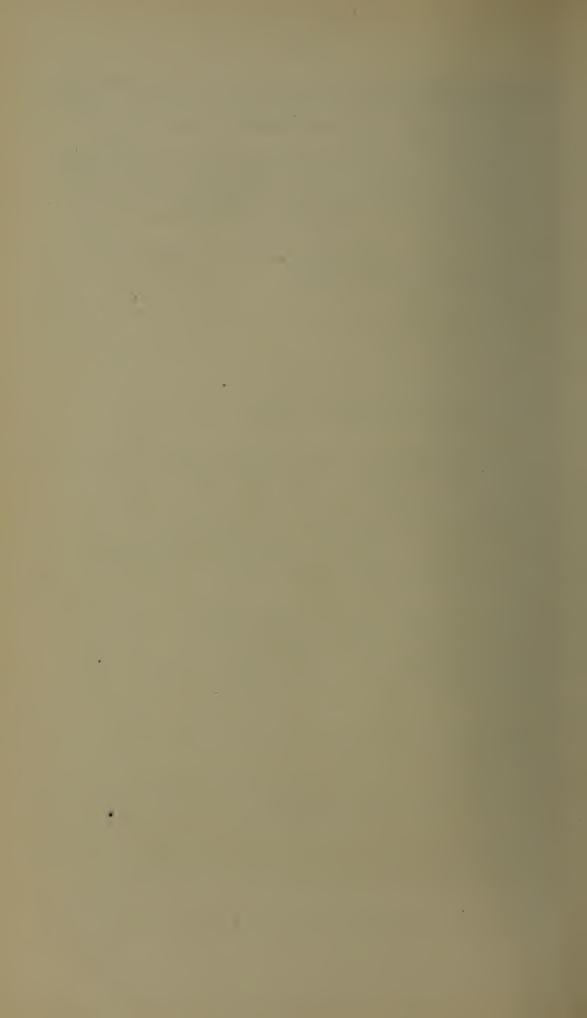
Although it is regrettable that this case could not bring out the soundest evidence necessary to solve the question of the olfactory center, I believe such a case and such an alteration in the cornu ammonis is a matter of enough interest to be reported, and may be a contribution to further investigation on this question.

In closing this report I wish to acknowledge my great indebtedness to Dr. E. E. Southard and Dr. M. M. Canavan, whose kind help enabled me to investigate the brain discussed. I also wish to thank Mr. Herbert W. Taylor, the photographer, who prepared the photographs.

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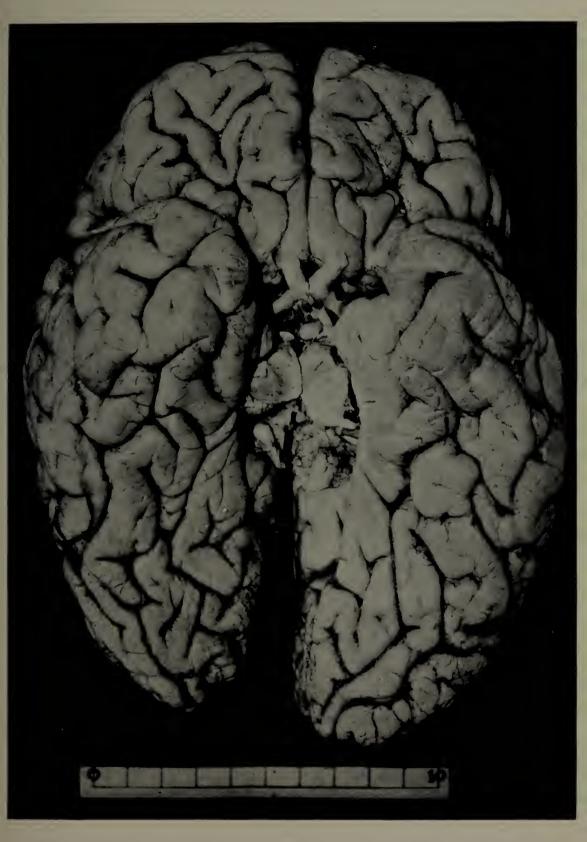


Fig. 1. — The base of the brain entirely bereft of bulbus and tractus olfactorius; rudimentary development of trigonum olfactorium and sulcus olfactorius are noticeable.





Fig. 2. - Mesial view of right hemisphere of the brain (see the description of macroscopic findings).

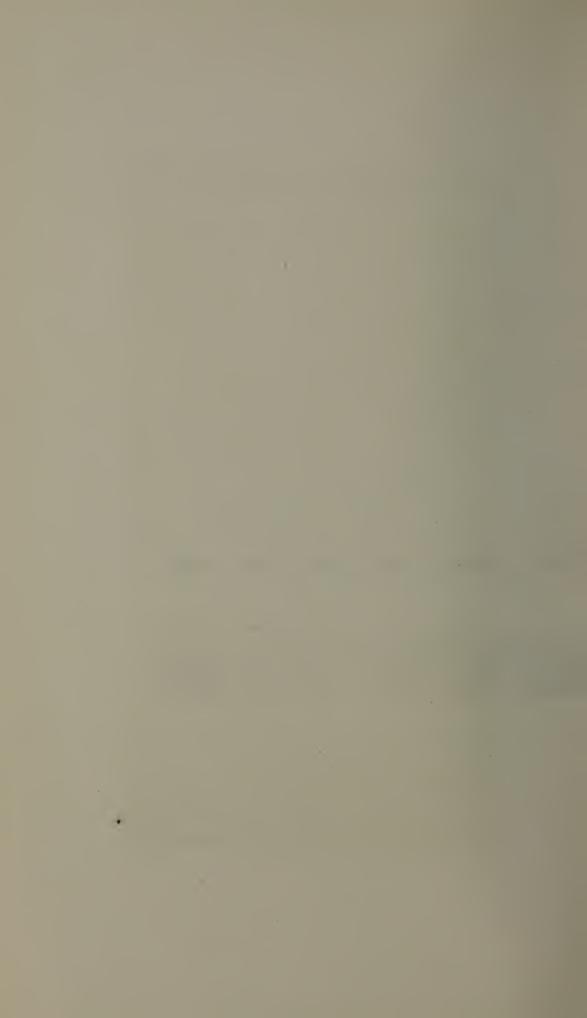
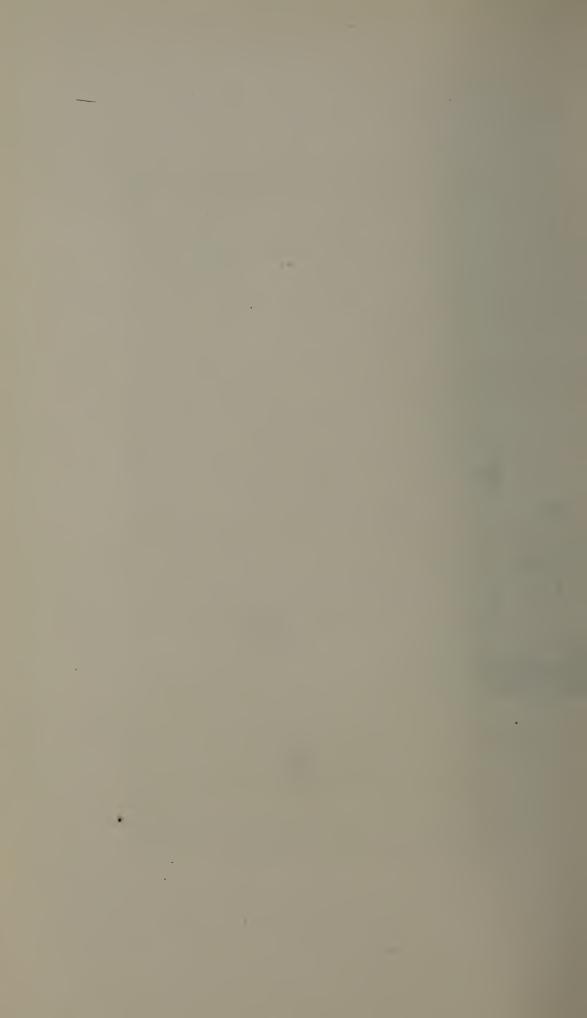
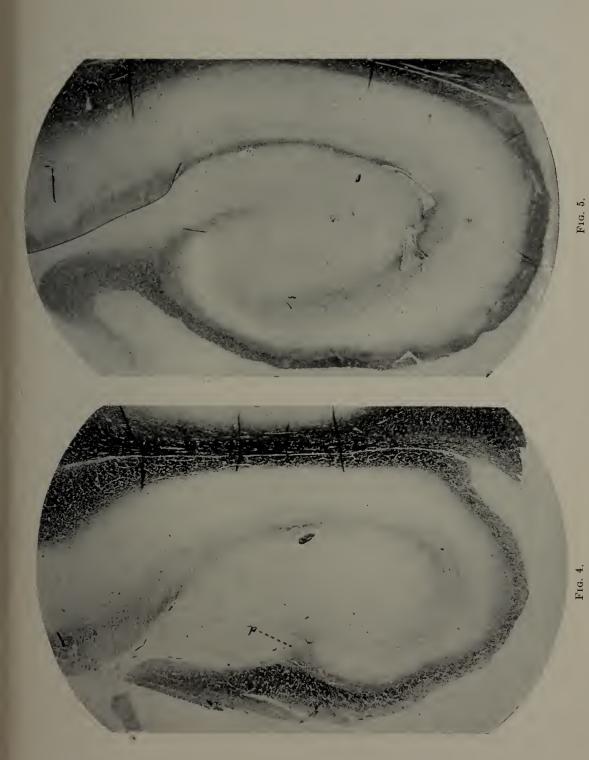




Fig. 3. — Mesial view of left hemisphere of the brain.





The deep branch of the alveus (d) which spreads into the terminal plate (into fascia dentate) is shortened and Fig. 4. - Section of the cornu ammonis (right), which is atrophied and the layer of gray matter remarkably narrowed stains poorly (see also Fig. 15). Compare this with Fig. 5.

Fig. 5. — Section of about the same region of a normal cornu ammonis. Kulschitzky-Wolter's modification of Weigert's myelin sheath stain; thickness, 15 microns.



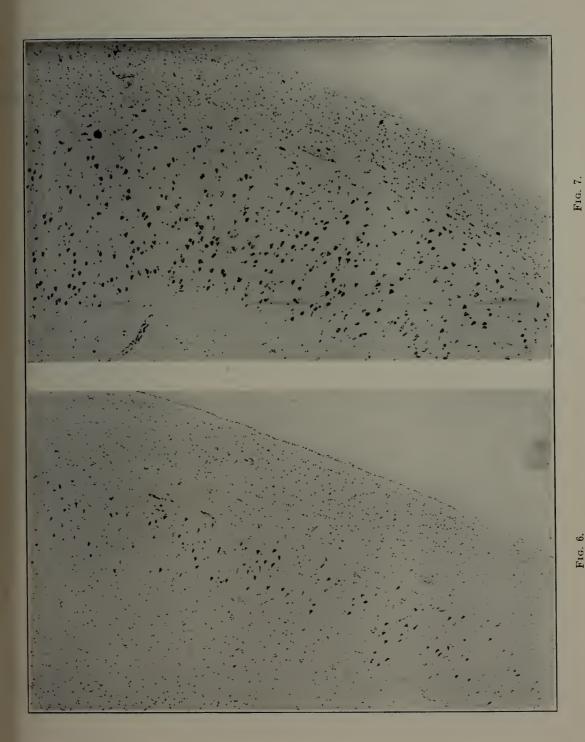
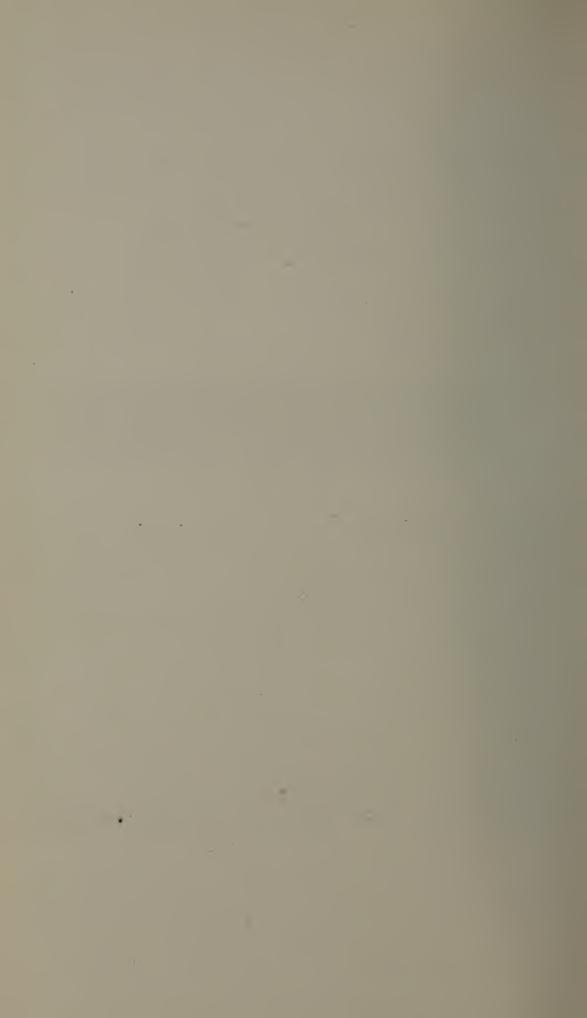


Fig. 6. - An area in the dorsal plate of a section of the cornu ammonis (left); cell layer is remarkably narrowed, pyramid cells are reduced in number and atrophied; thickened walls of blood vessels are also noticeable. Compare this with Fig. 7.

Fig. 7. - The same area as in Fig. 6 of about the same region of a normal cornu ammonis. (Cresyl violet stain in paraffin section after formaldehyde and alcohol fixation; thickness, 6 microns.)



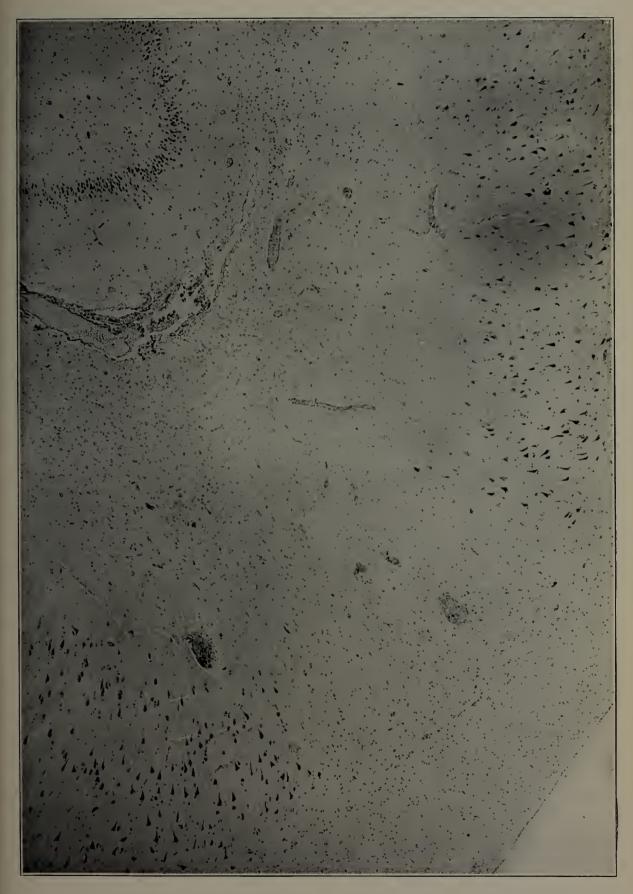


Fig. 8.—A gross gap of cell layer in the cornu ammonis (left). The pyramid cells have entirely disappeared in this lesion, and it is filled up by neuroglia. Atrophy of pyramid cells is also noticeable. Formalin and alcohol fixation; cresyl violet stain; thickness, 6 microns.

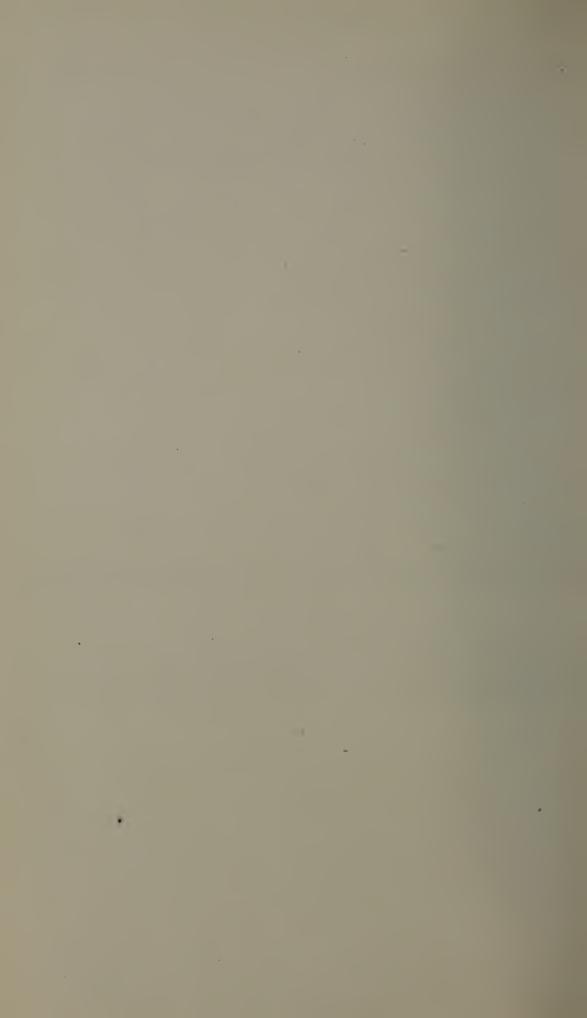




Fig. 9. — Alteration of nerve cells in the terminal plate of the cornu ammonis (left); they are reduced in number and markedly atrophied. Fine construction of these nerve cells can be seen in Fig. 10. Compare with Fig. 11.





Fig. 10. — Alteration of nerve cells in the terminal plate of the cornu ammonis (left); they are reduced in number and markedly atrophied. Fine construction of these nerve cells can be seen in Fig. 10. Compare with Fig. 12.

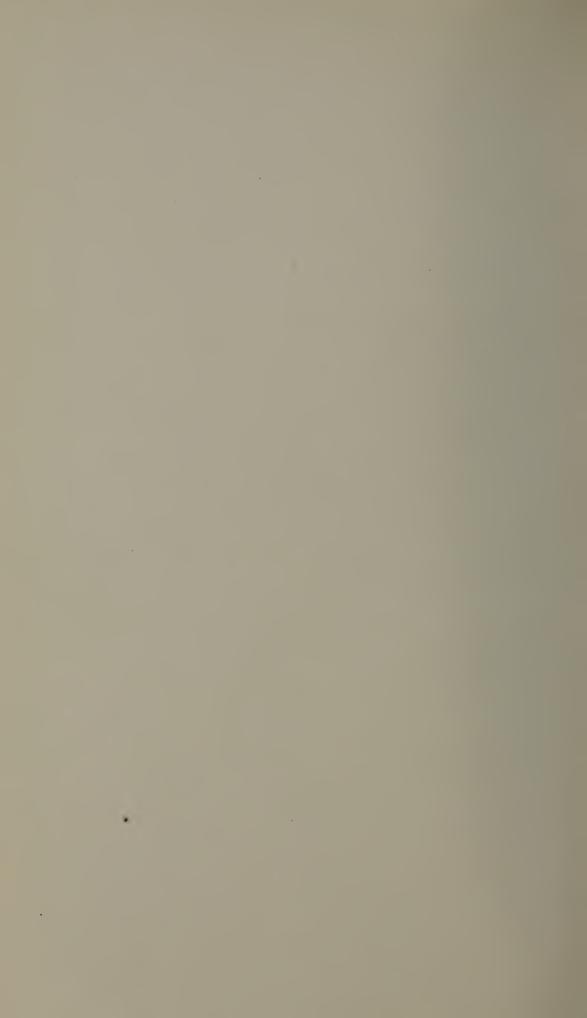




Fig. 11. — Nerve cells in the terminal plate of a normal cornu ammonis. Formaldehyde alcohol fixation; cresyl violet stain; thickness, 6 microns.

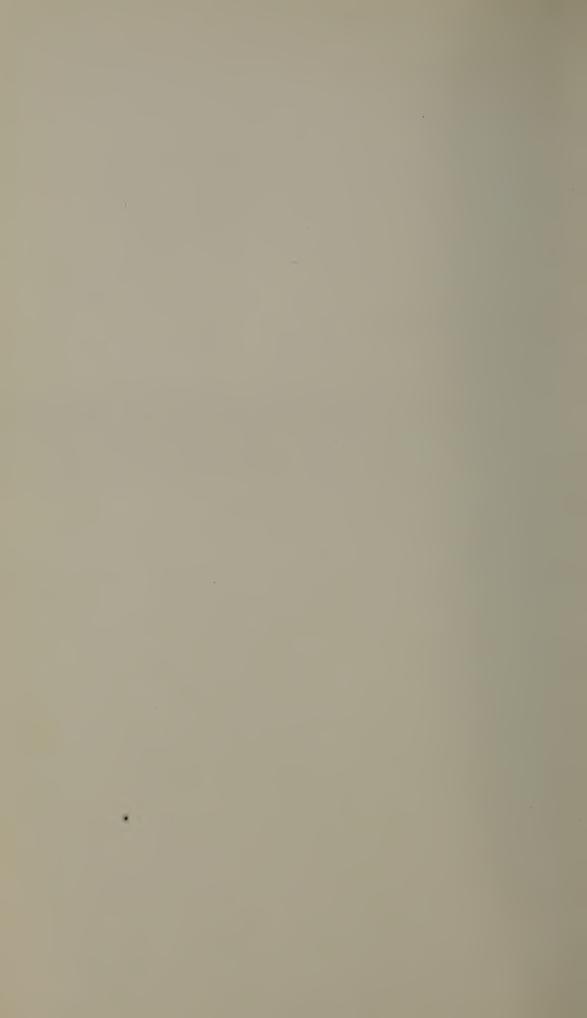




Fig. 12.— Finer details of these nerve cells shown in Fig. 11. Formaldehyde alcohol fixation cresyl violet stain; thickness, 6 microns.



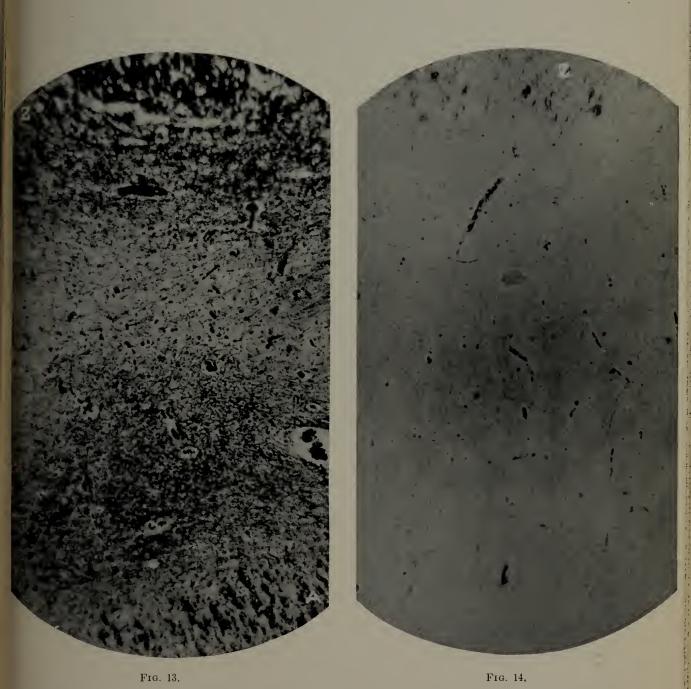
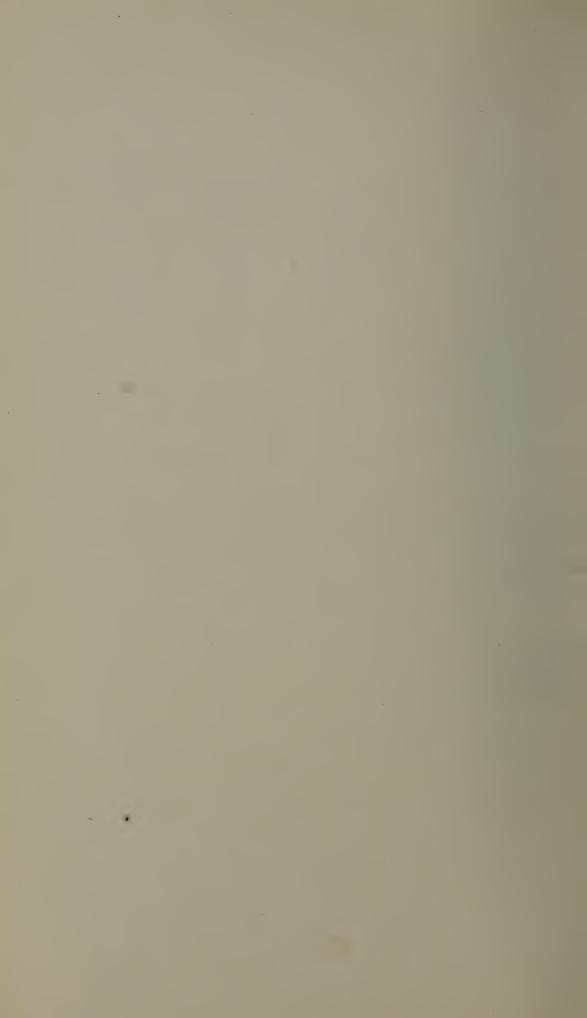


Fig. 13. — An area in the dorsal plate of the cornu ammonis (right); in this lesion the gray matter has almost disappeared, and nerve fibers in the narrowed layer of gray matter are pressed together between stratum zonale (Z) and alveus (A). Compare this with Fig. 14.

Fig. 14. — The same area of about the same region of a normal cornu ammonis as in Fig. 13 (Z — stratum zonale). Kulschitzky-Wolter's modification of Weigert's myelin sheath stain; thickness, 15 m'crons.



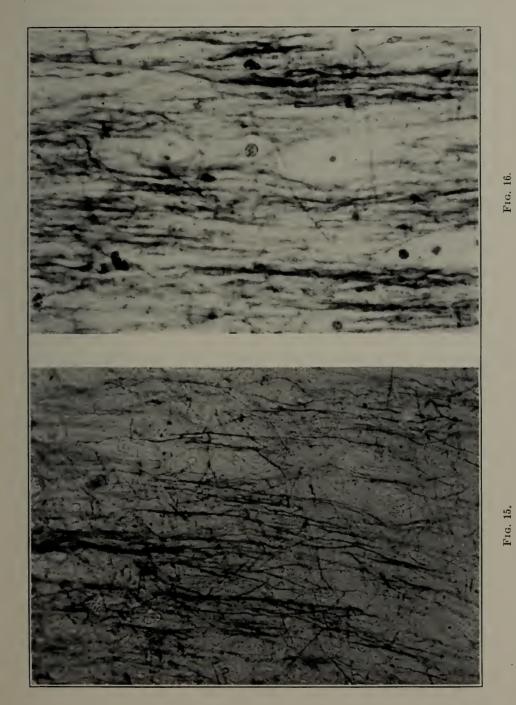


Fig. 15.—Fine construction of nerve fibers in the deep branch of the alveus (see also Fig. 4). The area presents itself just before the deep branch spreads among nerve cells in the terminal plate of the cornu ammonis (right). The nerve fibers are reduced in number and atrophied. Compare this with Fig. 16.

Fig. 16. — Nerve fibers in the same area of about the same region of a normal cornu ammonis as in Fig. 15, Kulschitzky-Wolter's modification of Weigert's myelin sheath stain; thickness 15 microns.

